

FSA

GDF SVEZ



RhapsodieNet

MWT
Electronic

User Guide

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1 Servo-controlled electric press-fitting

A servo-controlled electric press-fitting unit (UE) consists of:

- an instrumented (for force measurement) motor-driven shaft (the "pin")
- a power amplifier (the "servo")
- an electronic control unit (MVAT) (the "MVAT card")

The electronic control unit controls the movement of the pin shaft whilst monitoring the force being exercised on the shaft. It is controlled by On/Off inputs or by a field network (Profibus, Ethernet, Profinet for example). It can communicate with the outside world through 2 serial links (1 RS485 and 1 RS232).

The "programming" of a press-fitting unit involves defining position and force settings.
The interface with the press-fitting unit is carried out by the program **Rhapsodie.net**.

1.1 Geometric identification

IMPORTANT: The following is a full description of FSA's design approach

The positions of the end of the pin shaft are identified on an axis.

The zero point is defined during the calibration and learning cycle in pin pressing mode.

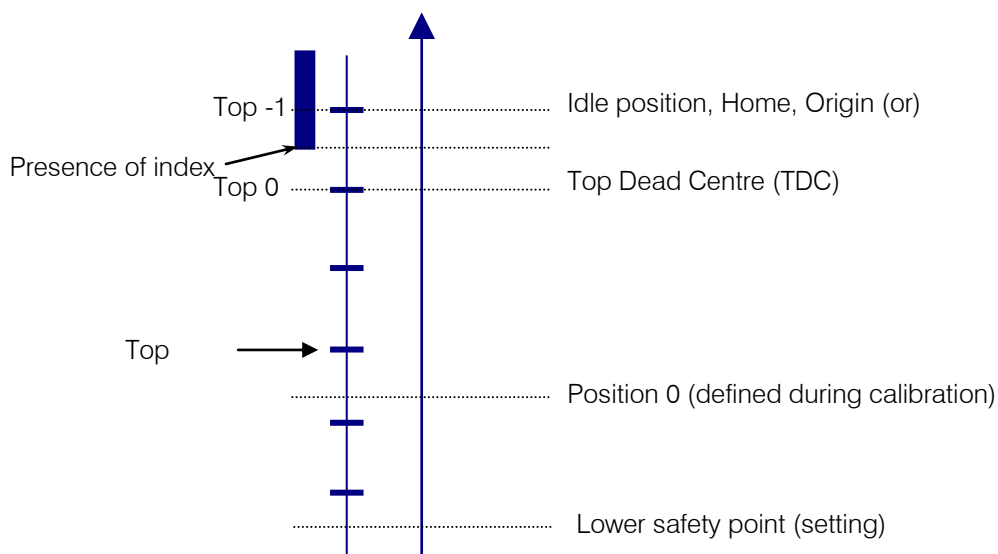
Positions decrease when the shaft exits and increase when it returns. It is essential to calibrate the press-fitting unit before using it otherwise it will not be possible to carry out a sequence.

***Note:** this calibration operation is requested by the electronic control unit each time the electrical environment of the press-fitting unit is changed and must be repeated every time a change is made to the mechanical environment of the press-fitting unit.*

The electronic control unit knows the position of the pin shaft through the pulses delivered by the speed controller (the speed controller drives the motor through the synchro-resolver mounted on the shaft).

An inductive sensor (called the **Index**) active when the shaft is in home position, allows the absolute number of motor revolutions to be determined.

The **Top Dead Centre** (TDC) and the **lower safety point** delimit the working area of the press-fitting unit. Top dead centre equates to the position reached at the instant of the pulse on the first revolution after the loss of the index when the shaft exits. The lower safety point is a setting defined according to the mechanical environment of the pin



Note: In "manual raise" mode, the pin stops on the index while during normal operation, it stops in the idle position.

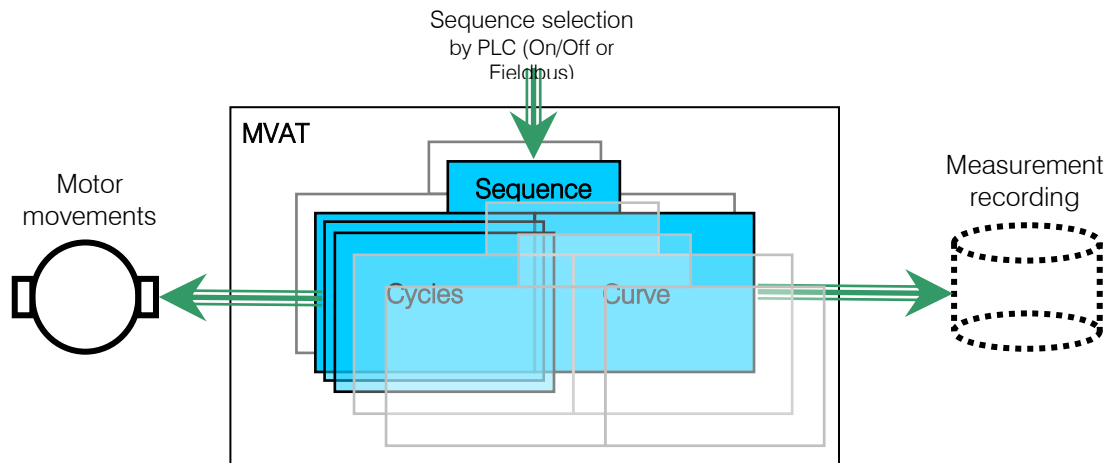
1.2 Sequence, Cycle, Curve: definitions

The programs (each, a series of pin shaft displacements) are called "**Sequences**". Each sequence is identified by a number (1 to 512) and **always starts with the shaft in idle position**.

The sequences are made up of "**Cycles**" which can be chained together one after the other and are identified by a number (1 to 384).

The change in the force during the sequence can be memorised in the "**Curves**" or in the "**Profils**". The curves or profiles constitute storage programs which are identified by a number (1 to 16 for the curves or 17 to 100 for the profiles) and allocated to a sequence.

ALL the settings describing sequences, cycles and curves are defined through the **Rhapsodie.net** GUI.



A sequence is therefore described very simply by the **number of the first cycle to be executed** and the **curve number** to be used to save the force values measured during the movements of the pin.

Note:

- sequences, cycles and curves numbered "0" do not exist and are used to designate a non-existent element (for example, the association of the curve "0" with a sequence, means "No storage program associated with this sequence").
- The "Cycle start" input must be active throughout the execution of the sequence, otherwise the press-fitting units stops immediately and signals an emergency stop.

1.3 Cycles, chains

A cycle describes an elementary movement of the pin. The main settings used to define a cycle are the **trip force** and the **trip position**.

The MVAT card stops the pin shaft either:

- when the trip position is reached
- when the trip force is applied.

The system then simultaneously saves the final force and the position reached. Various types of configurable quality checks enable the cycle to be declared OK or not OK. If the pin stops on the position, the force may go outside the tolerances. Likewise, if it is the force which causes the trip, the position may not comply with the programmed tolerances.

The following data is entered to describe the basic movement:

- the cycle type, chosen from the options "Press-fit", "Acquisition" or "Positioning"
- the direction of movement: "Pressing" or "Pulling"
- the **Engagement position**, which defines the change from the **Approach speed** to the **Working speed**.
- the **Slowing down position**, which defines the change from the **Working speed** to the **Trip speed**.
- the **Trip position**, and its tolerances
- the **Trip force**, and its tolerances
- the **maximum allowed current**
- the cycle to be chained if necessary

Pin shaft movements may be chained together.

Chains may be determined either:

- when programming the cycles themselves. This is known as **SOFT chaining**. The MVAT card will chain the cycles.
- from the outside (PLC), this is known as **Hard chaining**. At the end of the current cycle, the PLC selects the next sequence to execute. The MVAT card then chains the sequences.

1.4 Quality check

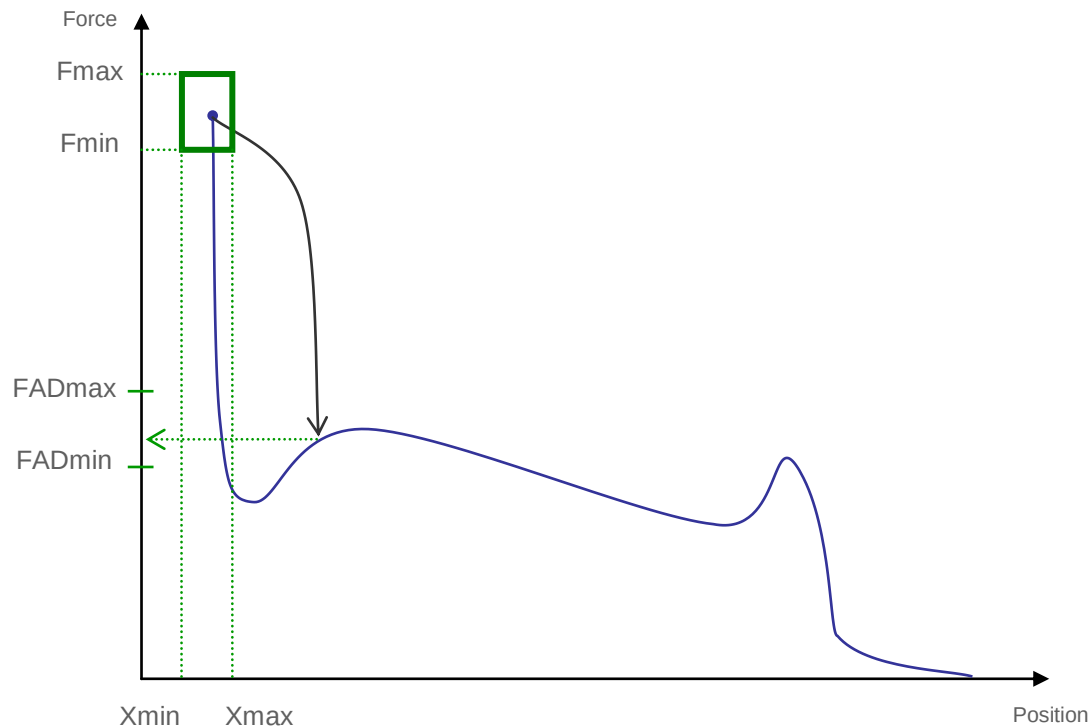
1.4.1 Cycle OK

For a cycle to be OK, the following conditions must be fulfilled:

- Final force is within tolerances
- Final position is within tolerances
- Calculation of the difference in position when compared with the preceding cycle or an "initial " cycle is within tolerances
- "Force Before Stop" (FBS) is within tolerances.

Note: any of these checks may be inhibited.

All of these checks may be represented (excluding differential check) as follows:



1.4.2 Curve check OK

For a curve program to be declared OK, all the checks it carries out must also be OK.

A curve program:

- Stores the force during displacement for 5 separate recording ranges.
- Positions 5 check windows in total over these recording ranges.

The 5 recording ranges may be positioned absolutely, or on a force threshold.

The 5 check windows, trapezoidal in shape, may be positioned absolutely or relative to the recording ranges.

9 check modes are possible using these windows:

- Inclusion (the curve must pass completely through the check window)
- Strict inclusion (the curve must pass completely through the check window and not exit from it)
- Increasing, decreasing (the curve increases/decreases in the check window)
- Peak, trough (the curve has a maximum/minimum greater than/less than the entry or exit point)
- Mean, Dynamic Mean (the mean or the dynamic mean of the curve must be within the check window)

- Working (the working calculation - surface of the curve - must be between a maximum and a minimum)

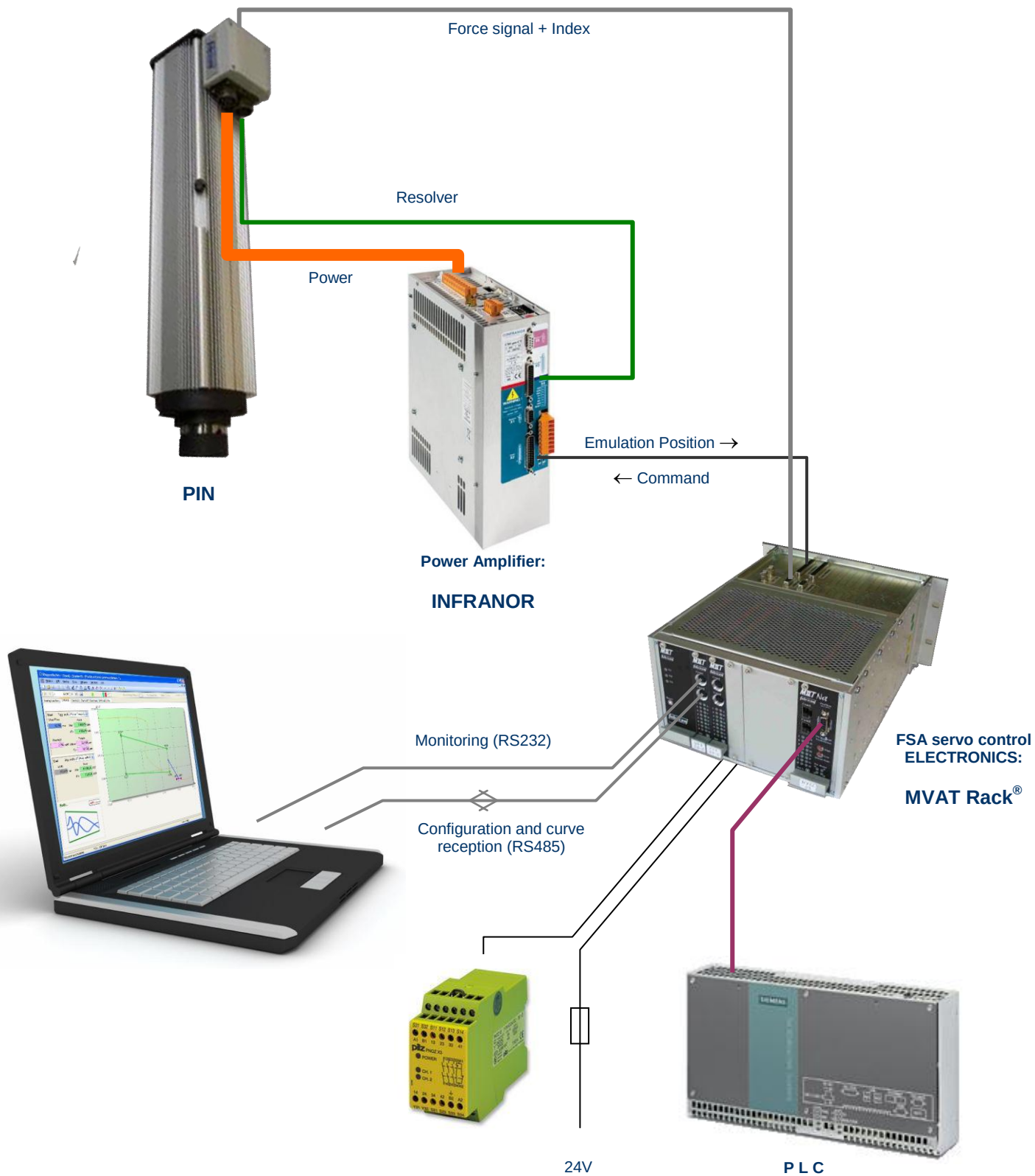
Each check window has its own check.

It is of course possible to inhibit the quality of this check.

1.4.3 Sequence OK.

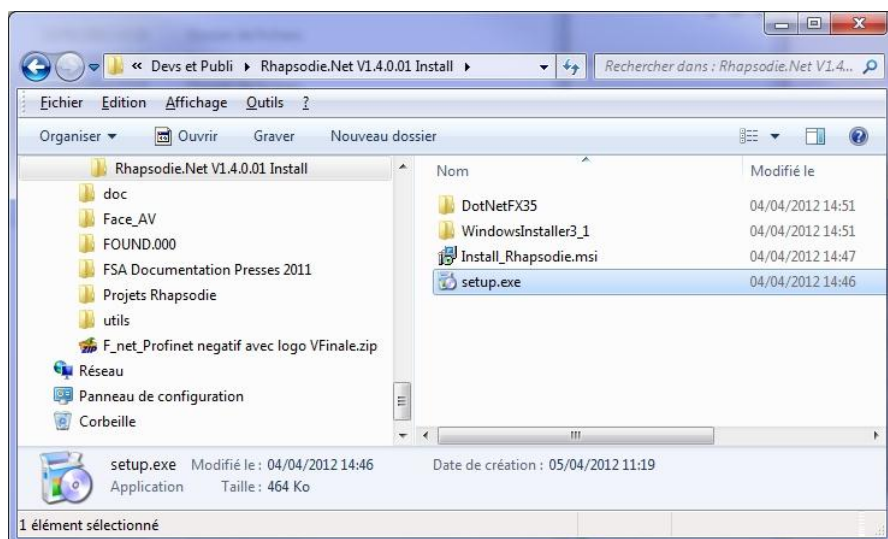
For a sequence to be OK, all the cycles executed and the curve must be declared OK by the MVAT.

2 Hardware



3 Installation

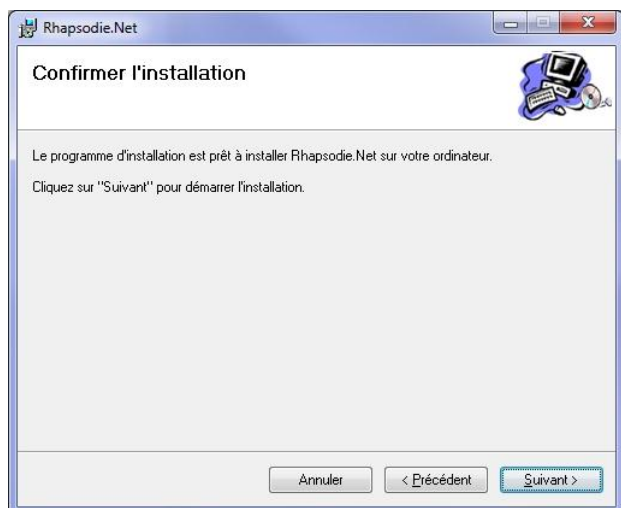
Insert the Installation medium (CD, USB flash drive, etc.) and double click on "Setup.exe"



The following screen appears, click "Next" then **leave "C:\Rhapsodie.Net"**, and click "Next"



Click "Next", Rhapsodie.Net is now ready to start.



During installation, 2 extra softwares are installed :

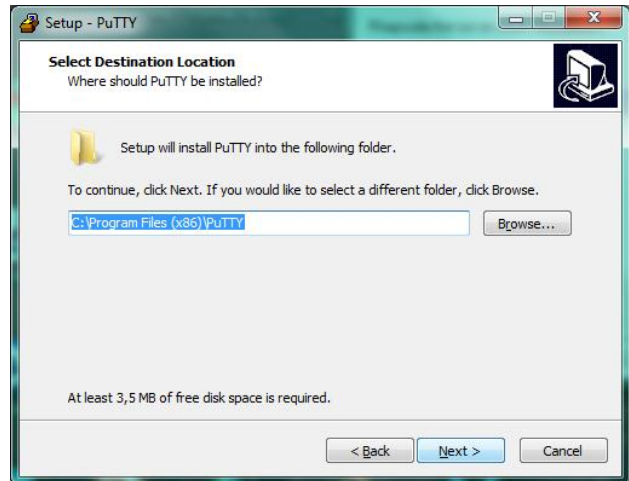
- **puTTY** : terminal which able to dialog the MVAT card through its Com1 port (RS232). It replaces the windows Hyperterminal, not enable anymore since Windows 7.
- **com0com** : Generation and redirection of Virtual com port to Ethernet software (used only when an UExp-MVAT panel is present on the station)

Steps : Installing puTTY

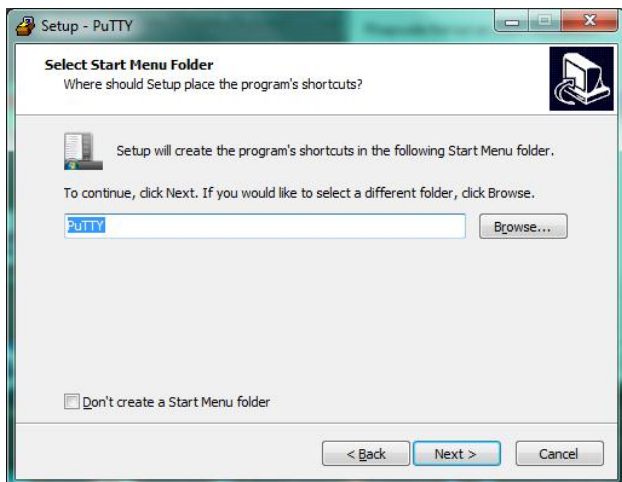
Choose « Next »



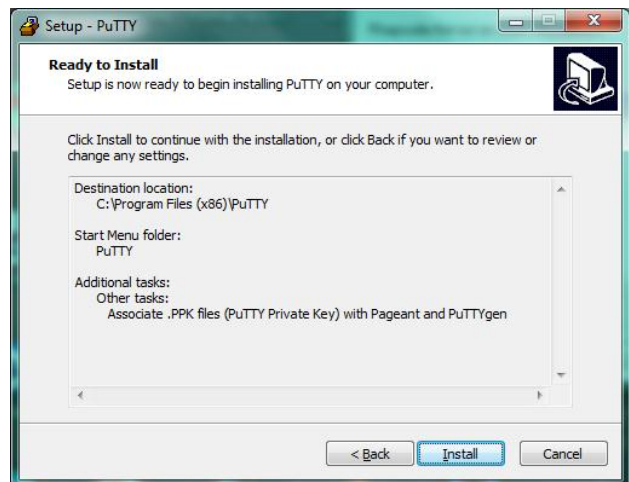
Leave the default directory



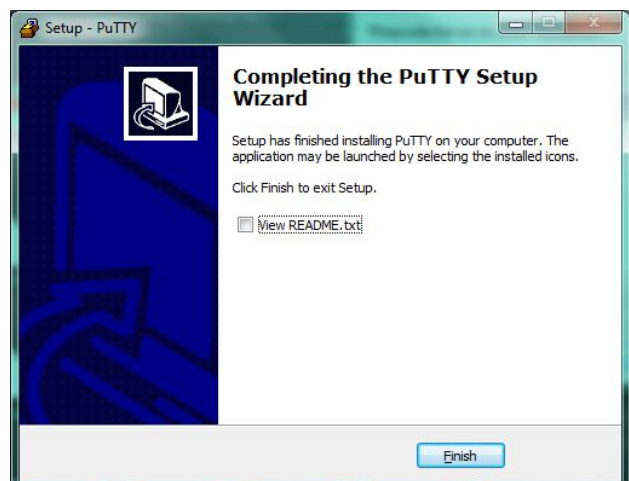
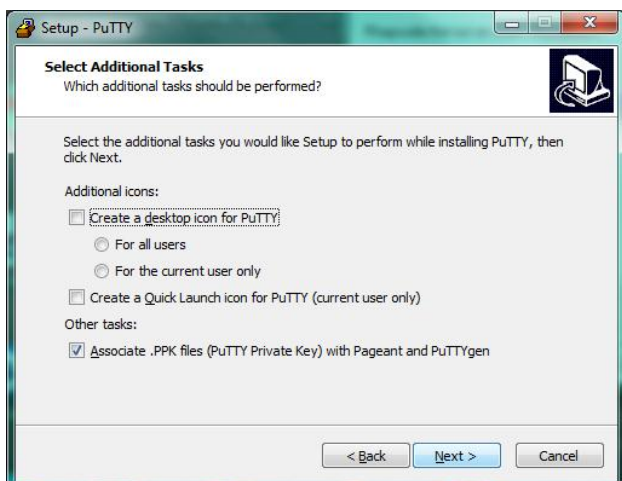
Choose « Next »



Clic on « Install »

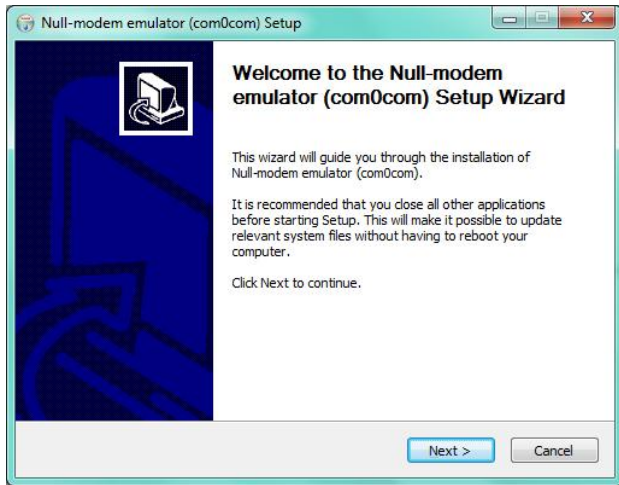


Leave just the last checkbox checked and choose « Next » Clic on « Finish »

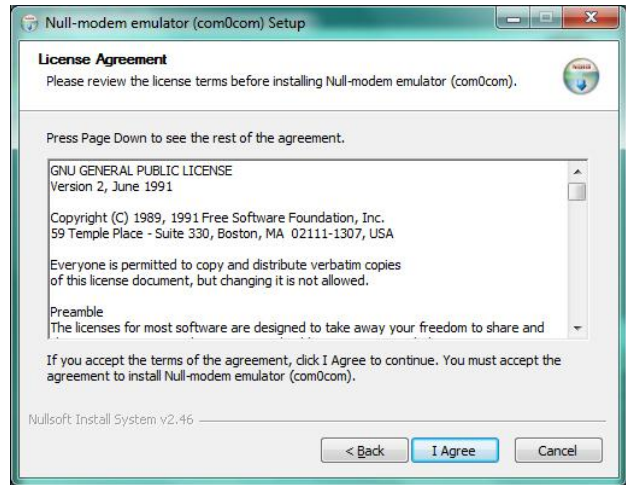


Steps : Install com0com

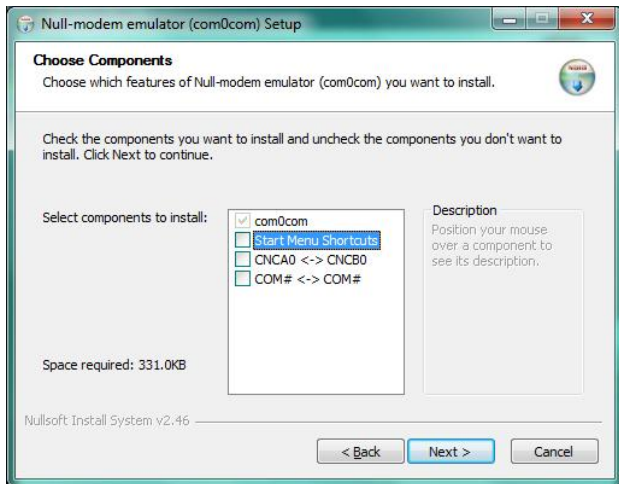
Choose « Next »



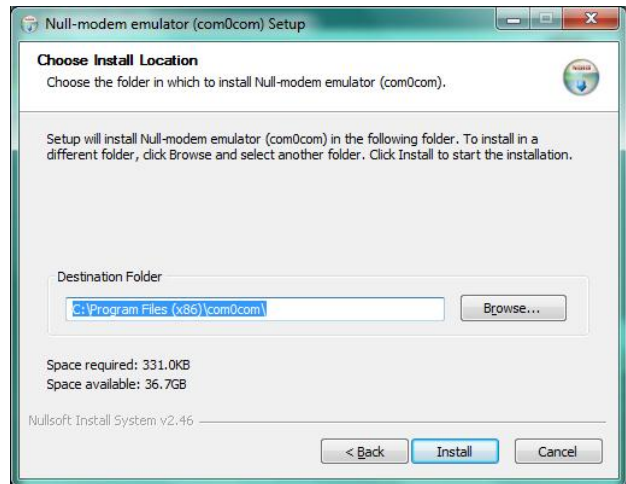
Clic « I Agree »



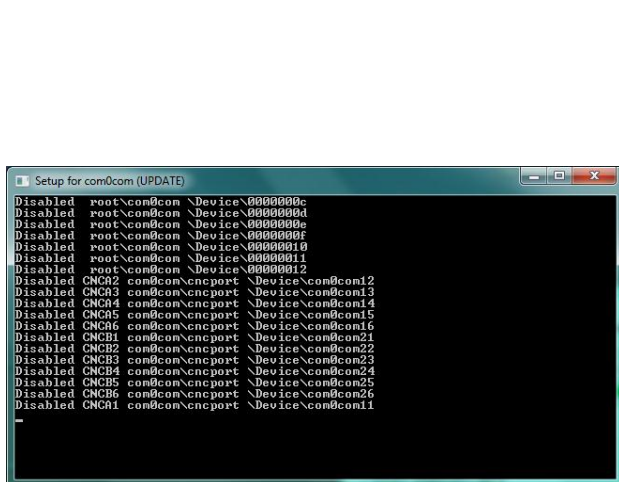
Uncheck all the checkbox and choose « Next »



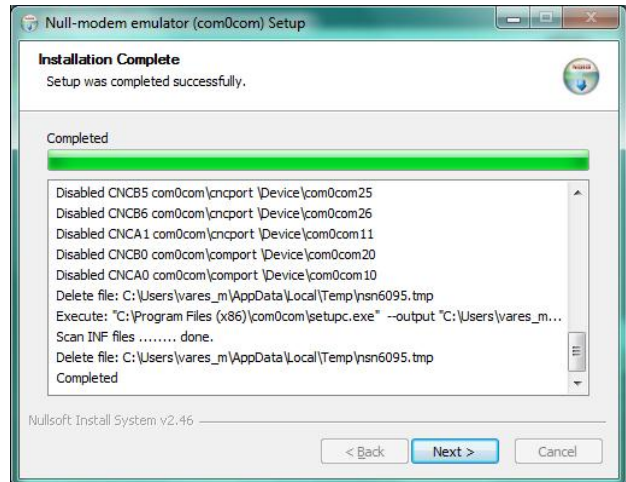
Clic on « Install »



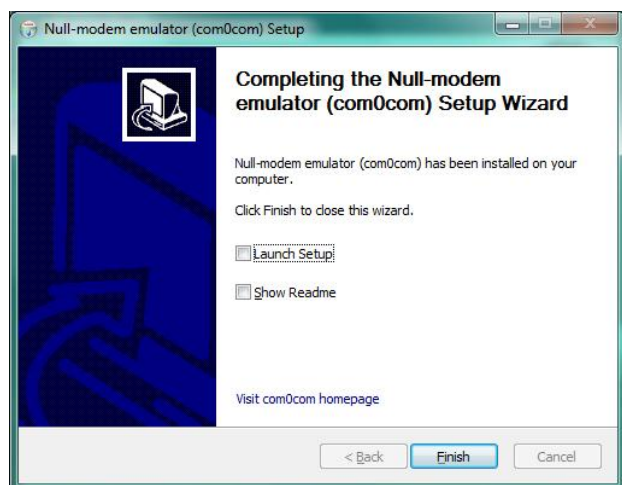
Screen during installation



Clic on « Next »



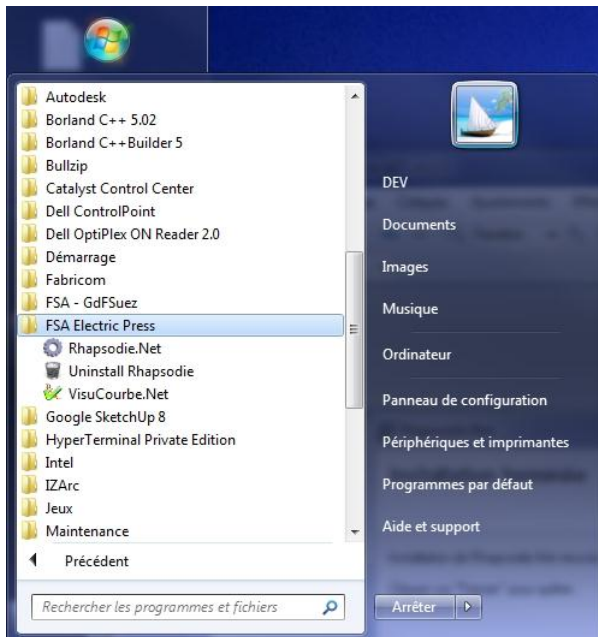
Clic on « Finish »



Now, all the softwares are installed, and an icon is added to the desktop:

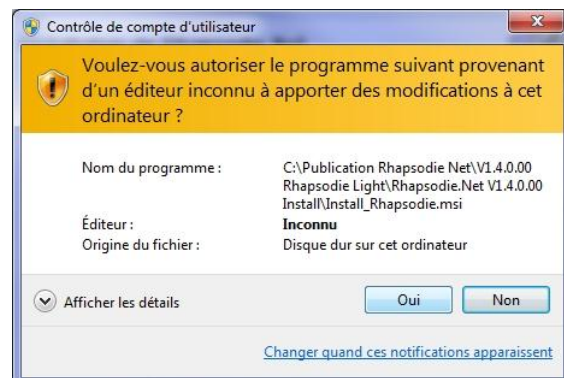
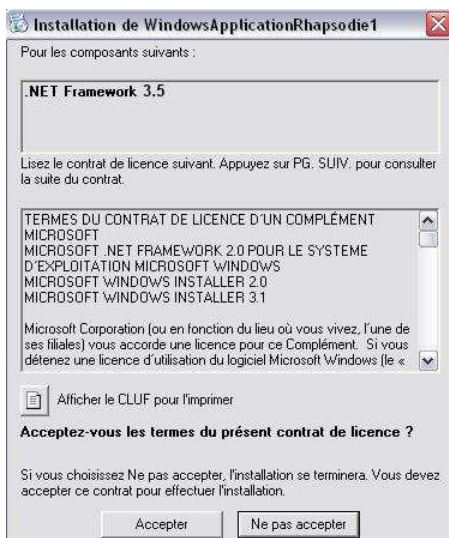


And the following shortcuts are added in "Start"/"All programs" menu :



Notes: If Microsoft Framework 3.5 (Microsoft Windows components library) is not present on the PC, it will be installed automatically: (accept)

If during installation a window mentions Unknown Editor, accept:

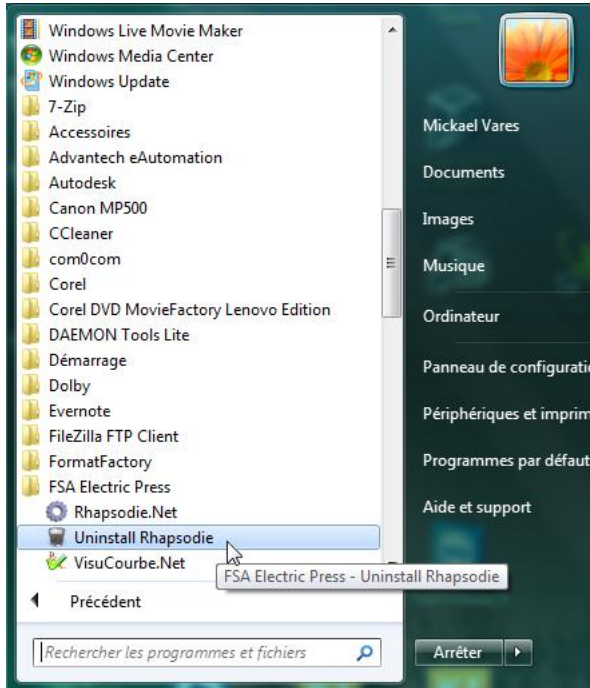


4 Updating software

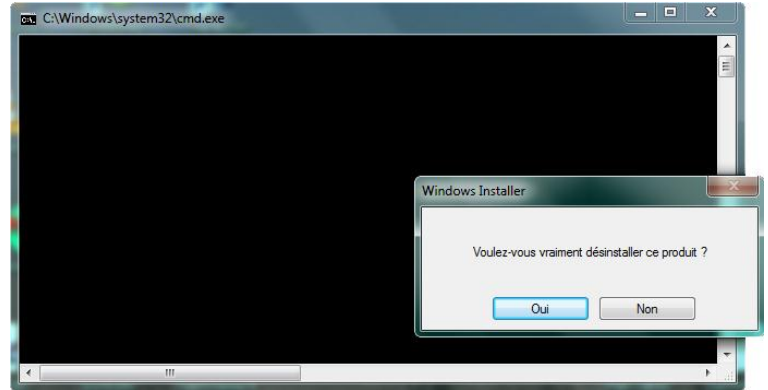
To update Rhapsodie.Net, you must first uninstall the installed version, then re-install the new version.

4.1 Uninstallation

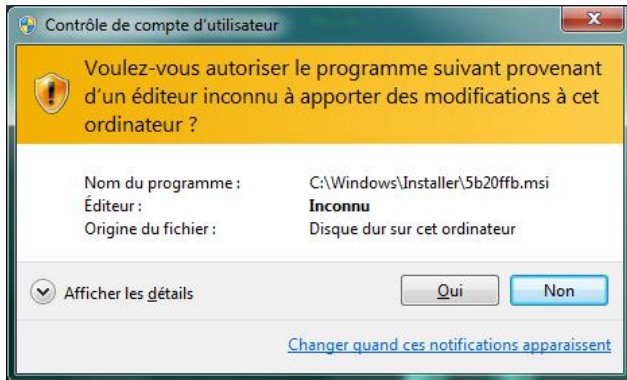
You just have to clic on the uninstall shortcut in « Start Menu/FSA Electric Press » :



Then follow instructions : answer "YES"



If during the uninstallation, a window alerts about unknow Editor, please accept :



4.2 Re-installation

See Installation chapter.

5 1st Run

5.1 Software registration

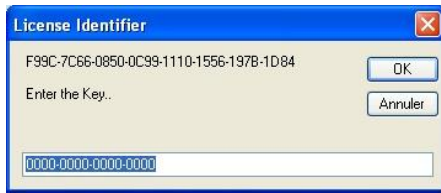
Run Rhapsodie.Net using the icon. When the software runs for the first time two information boxes are displayed as the licence has not been entered. Confirm each by clicking on OK.



The Splash Screen is displayed for 5 sec., followed by the main window:



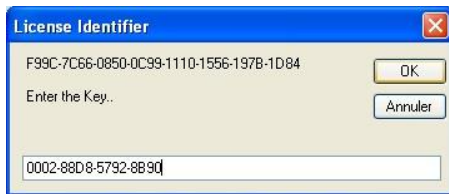
Then, to register Rhapsodie.net, select "Help"/"About"
The following data entry box appears:



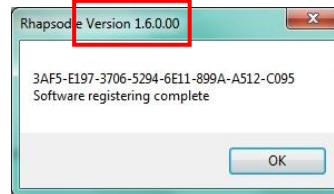
Read off the Identification number and call **Fabricom Presses after-sales service** (+33 (0)4-75-85-27-27) who will give you the registration key.

Remark : the updating from a version older than V1.5.0.7 to a new version generate a new license ID.

After entering the key:



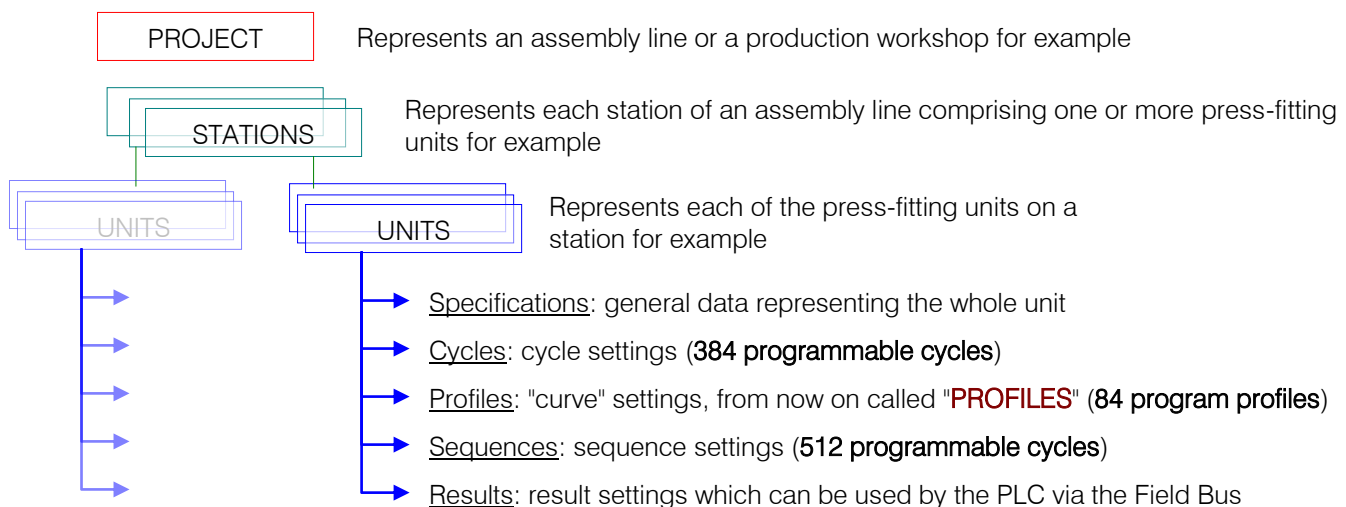
the following window appears showing the version installed.



You can now close Rhapsodie, then restart it.

5.2 Organisation of the software

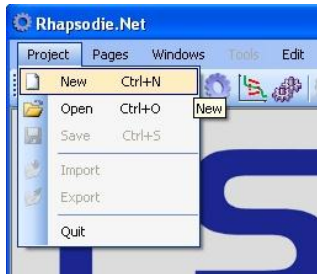
To provide a better idea of how Rhapsodie.net operates, the following diagram shows how it is organised:



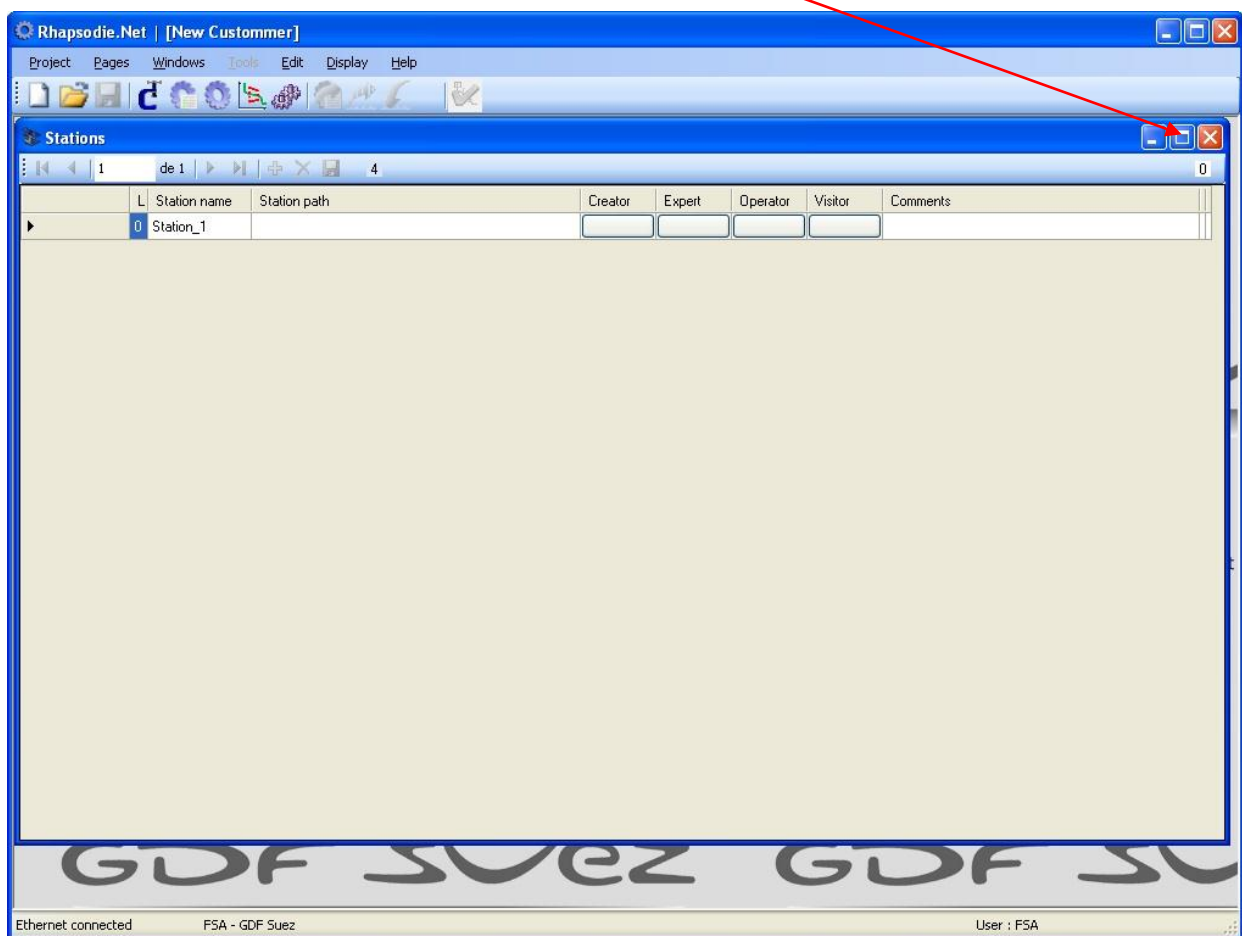
5.3 Creating a project with 1 station and 1 press-fitting unit

5.3.1 Creating a Project, Station and File path

To be able to send programs to the MVAT card, you must create a project.



The "Stations" page opens: (you can make it full screen if you want to)



One station is created by default ("Station_1"), but neither the directory where the file will be saved nor any passwords exist.

To change these, the **FIRST thing that must be done** is to create the "Creator" password:
Click the "Creator" button for station "Station_1".



Select a user name:
example: "EXPERT"
and password: "expert"



Then to confirm, you double click on the password confirmed and press OK.

The red "4" goes green and the column in front of the station name shows the person logged in:

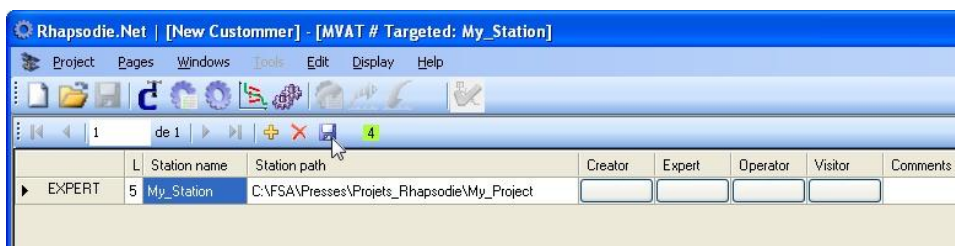


You **NOW** (not later!) change the name of the Station:

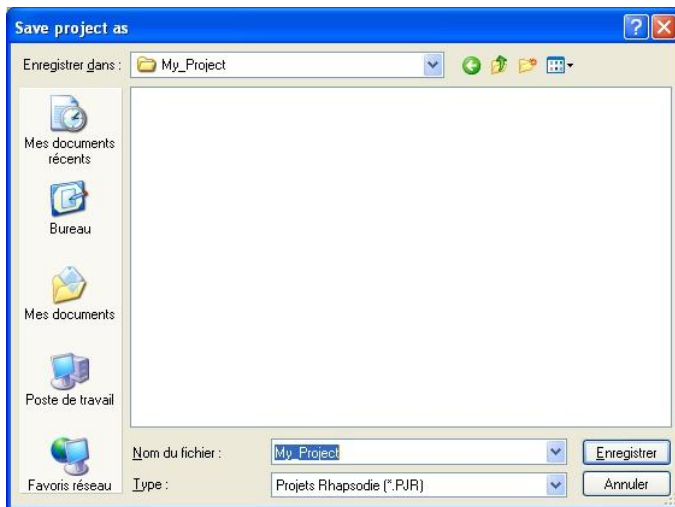
Example:

- "MY_STATION"
 - then the directory where the file will be saved, for example "C:\FSA\Presses\Projets_Rhapsodie\My_Project"
- (The directory C:\FSA\Presses\Projets_Rhapsodie\ will already have been created, and the directory "My_Project" is created during this step using the "Create a new directory" button)

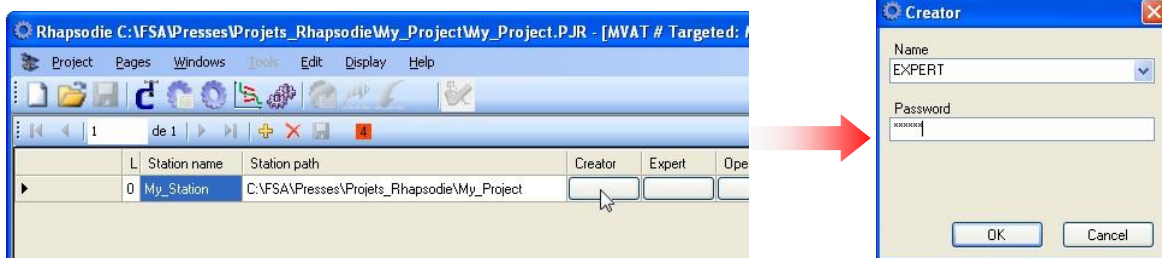
The diskette icon changes colour to indicate changes have been made. Click it.



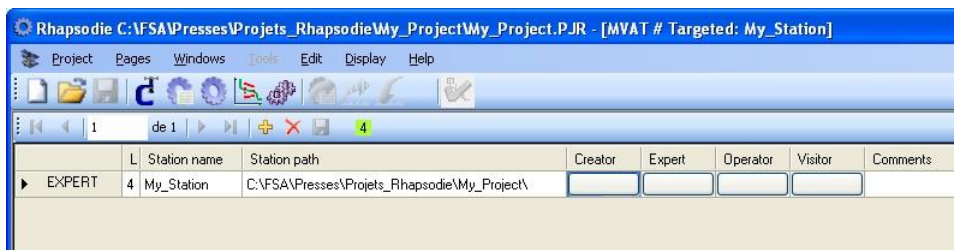
A "Save project as" window is displayed. We decide to give the PJR file the name "My_Project":



You are automatically logged out. You must then log back in and enter "EXPERT" "expert" then click OK:

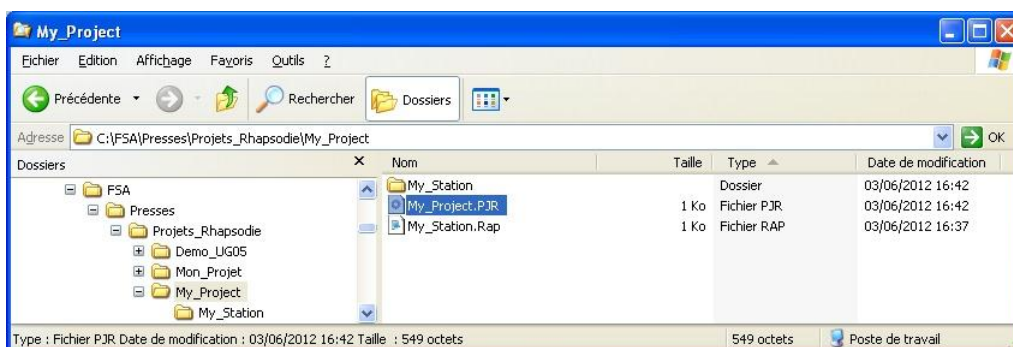


You are then logged in as creator (the "4" is in green) under the name "EXPERT" as before.



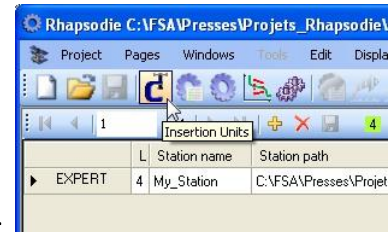
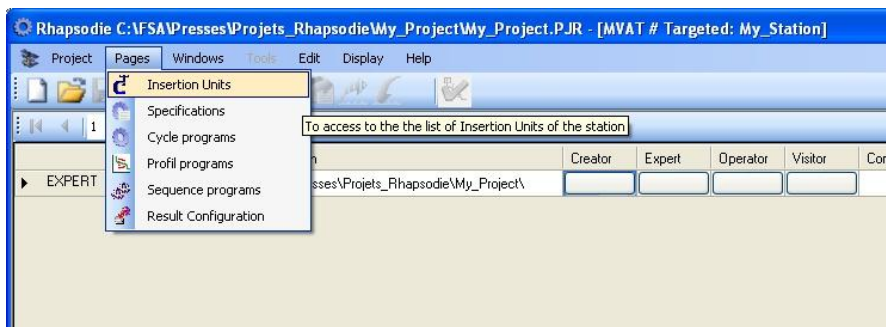
The project has been created, saved and includes a station called "My_Station".

The associated directory is structured as follows:



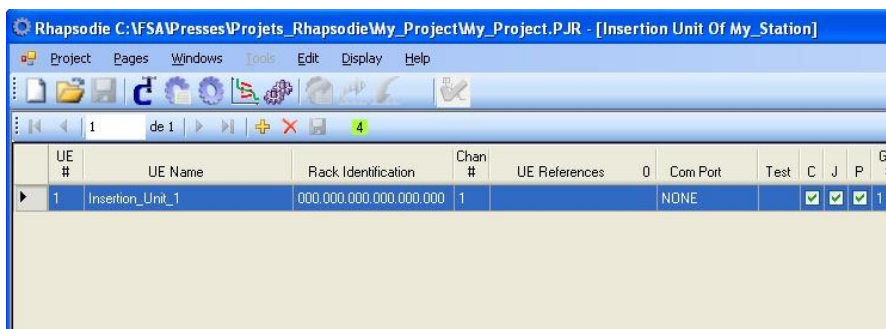
5.3.2 Creating a Press-fitting Unit

To create a unit, just open the "Insertion Unit" page which can be accessed from the setpoint menu:



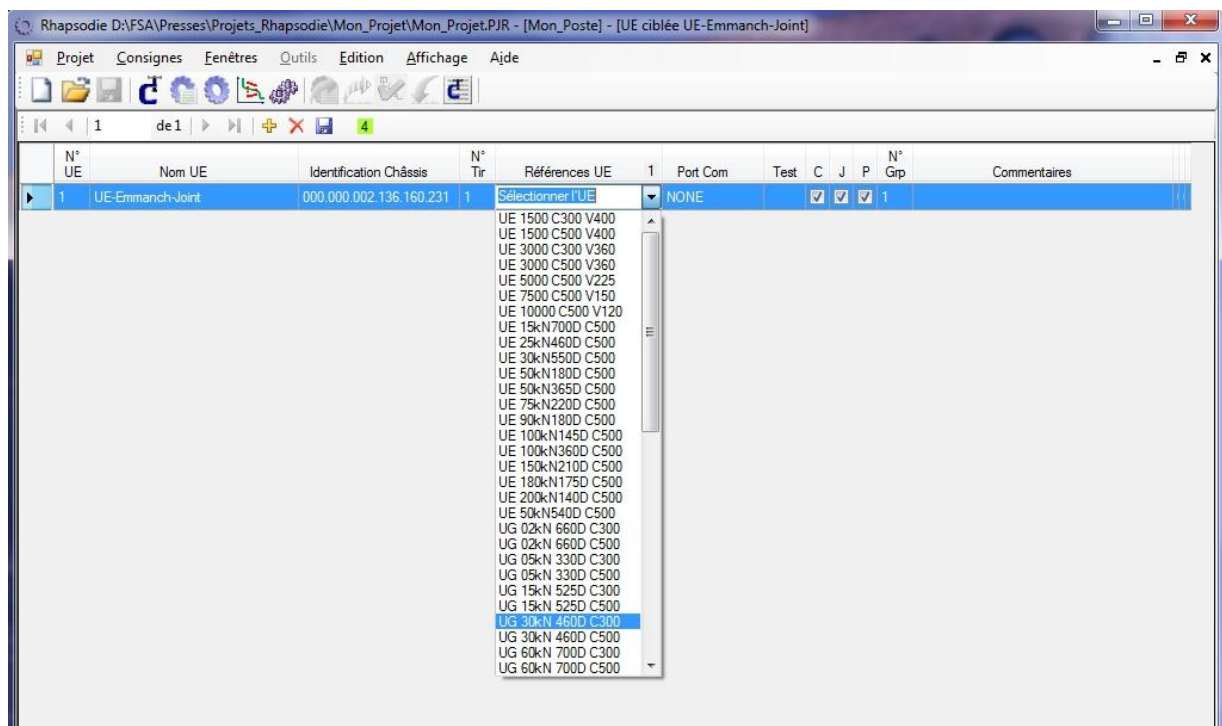
or

The Insertion Units page is displayed with one unit by default: Insertion_Unit_1.

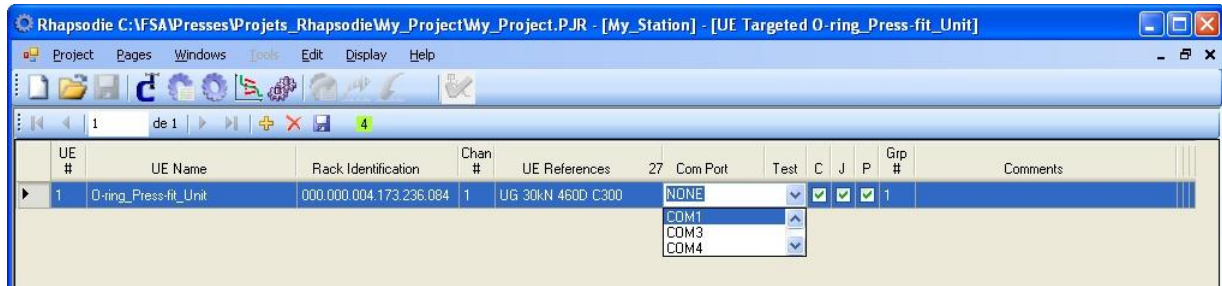


You must now change:

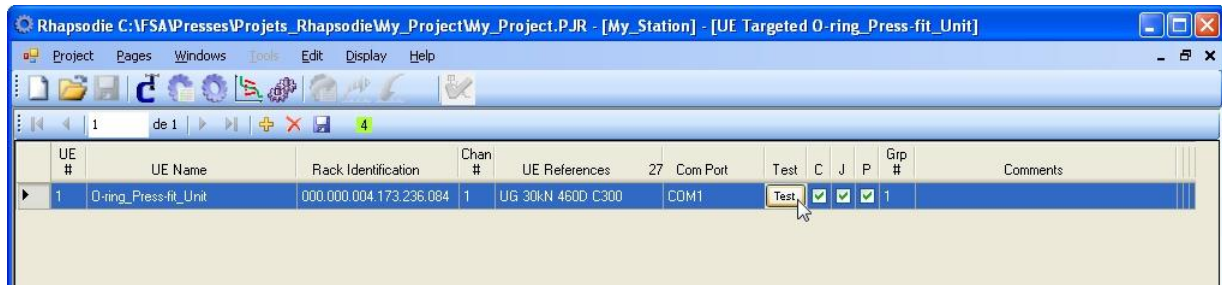
- the name: example "O-ring_Press-Fit_Unit"
- the Rack identification (see section "How to retrieve the MVAT rack identifier")
- Select the type of Pin in the "UE References" drop-down list,
- The boxes "C" (for running VisuCourbes with the project) and "P" for activating "Profiles" are already checked.



Then select the right COM port (see section "Managing COM ports")



And check the COM port selected is working properly by pressing the "Test" button which appears.



The response must be:



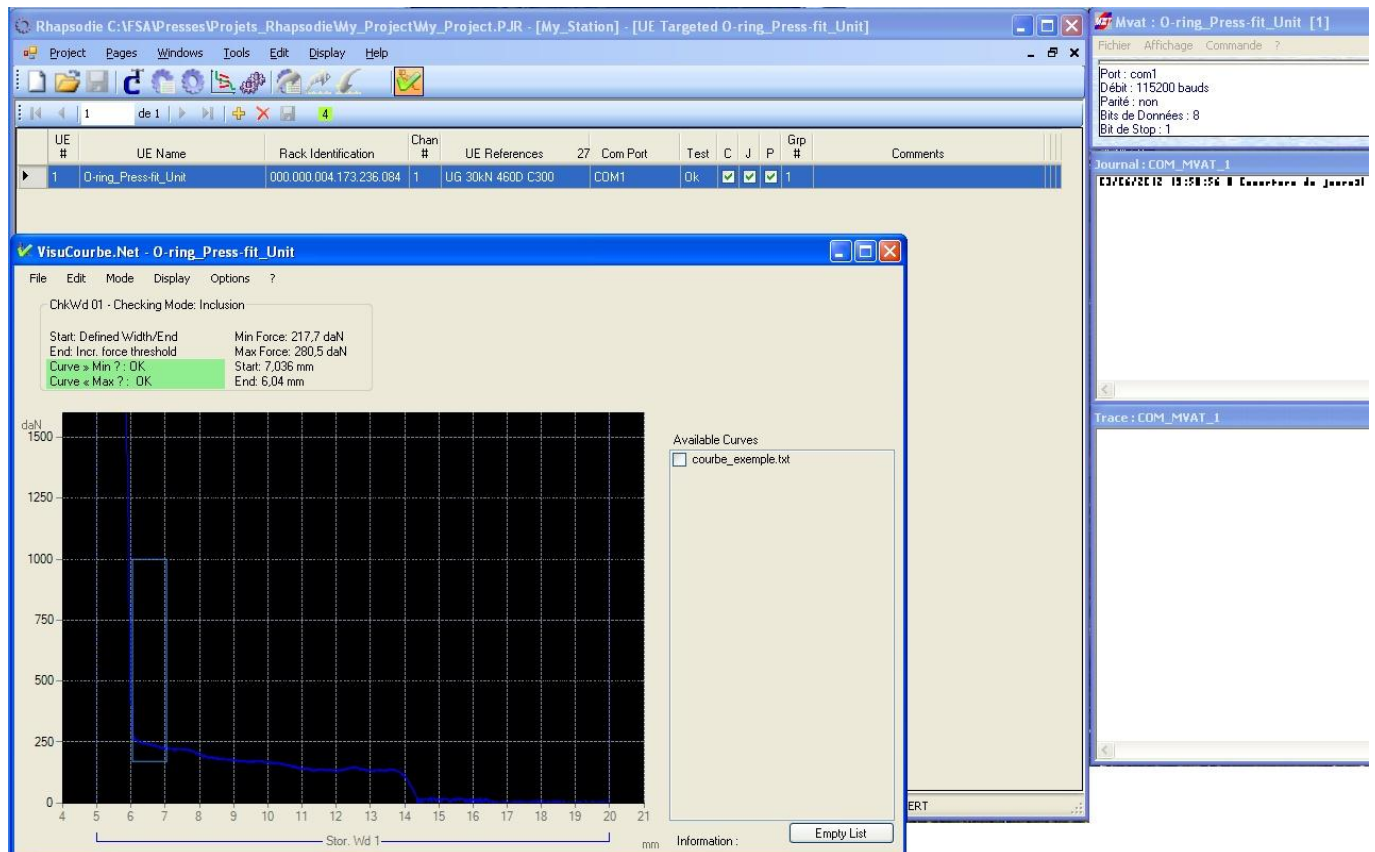
And not:



Or



You can save by clicking the diskette icon. The program which communicates between Rhapsodie.Net and the MVAT card now starts up along with the program VisuCourbes.Net:



You are now ready to program specifications, Cycles, Profiles and Sequences.

5.4 Programming

The following description does not include the advanced features of Rhapsodie.Net. The less commonly used settings are brought together in the "Advanced" tabs.

For more information, refer to the Advanced Functions section.

To access each of the programming pages, you must select the Unit for which you want to create programs.

To do this, click on the corresponding row. The title of the application changes when a unit is selected:

Before:



After:

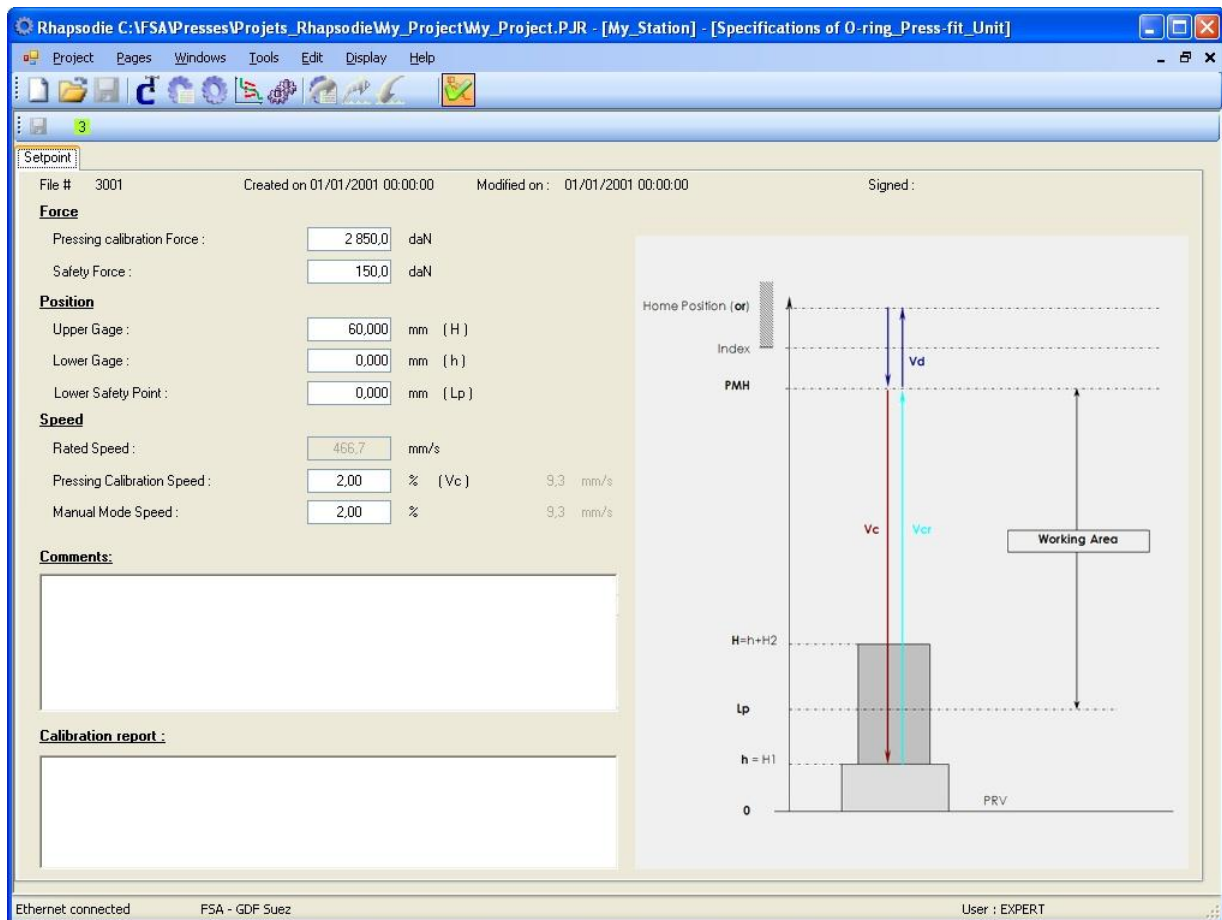


If this is not done, the following message appears if you try to open one of the programming pages:



5.4.1 Specifications

When you select the Setpoint/Specifications menu, or click the  button, the Specifications page appears:



5.4.1.1 Description of fields

Pressing calibration force This is the force to be applied during the pressing calibration cycles. No force may be programmed in a cycle which exceeds this force.

By **Default**, the value pre-entered is equal to **95%** of the maximum force of the pin (e.g. we have chosen a UG30kN, i.e. 3000 daN maximum force, so the default value will be 2850 daN).

The **minimum** force which can be programmed is **25%** of the maximum force (750 daN in our example)

The **maximum** programmable force is 100% - Offset default threshold = 5% by default, i.e. **95%**.

➔ [For more information on the calibration cycle, see the sections on Calibration.](#)

Safety force: This is the maximum allowed force during the approach phase of a cycle. If this force is encountered during this phase, the MVAT card stops the shaft and outputs fault no. 8.

This is also the maximum value used for monitoring during movements in manual mode.

By **Default**, the value pre-entered is equal to **10%** of the maximum force of the pin.

The **minimum** force which can be programmed is **1%** of the maximum force.

The **maximum** force which can be programmed is **25 %** of the maximum force.

Note: during a manual descent, the safety force is equal to the Safety force setpoint

If this setpoint is not entered, the safety force is set to 10% of the nominal value for the pin

Upper Gage: This is the AGGREGATED height of the upper gage and lower gage used during pressing calibration cycles.

By **Default**, the value pre-entered is equal to **60mm**.

Lower Gage: This is the height of the lower gage used during pressing calibration cycles.

By **Default**, the value pre-entered is equal to **0mm**.

There is thus a **minimum difference of 60 mm** between the two gauges. This minimum is recommended to ensure accuracy in positioning the shaft.

Lower Safety Point: value in mm of the position the pin must not overrun when exiting from the shaft. If this value is reached, the pin will stop and a fault number will be shown in the result block. This position must be between Bottom Dead Centre and Top Dead Centre ([see graph in appendix 1](#)).

PLEASE NOTE: This safety device is not enabled in MANUAL mode.

Pressing calibration speed: This is the speed at which the shaft will exit in the pressing calibration cycle looking for a force.

By **Default**, the value pre-entered is equal to **2%**.

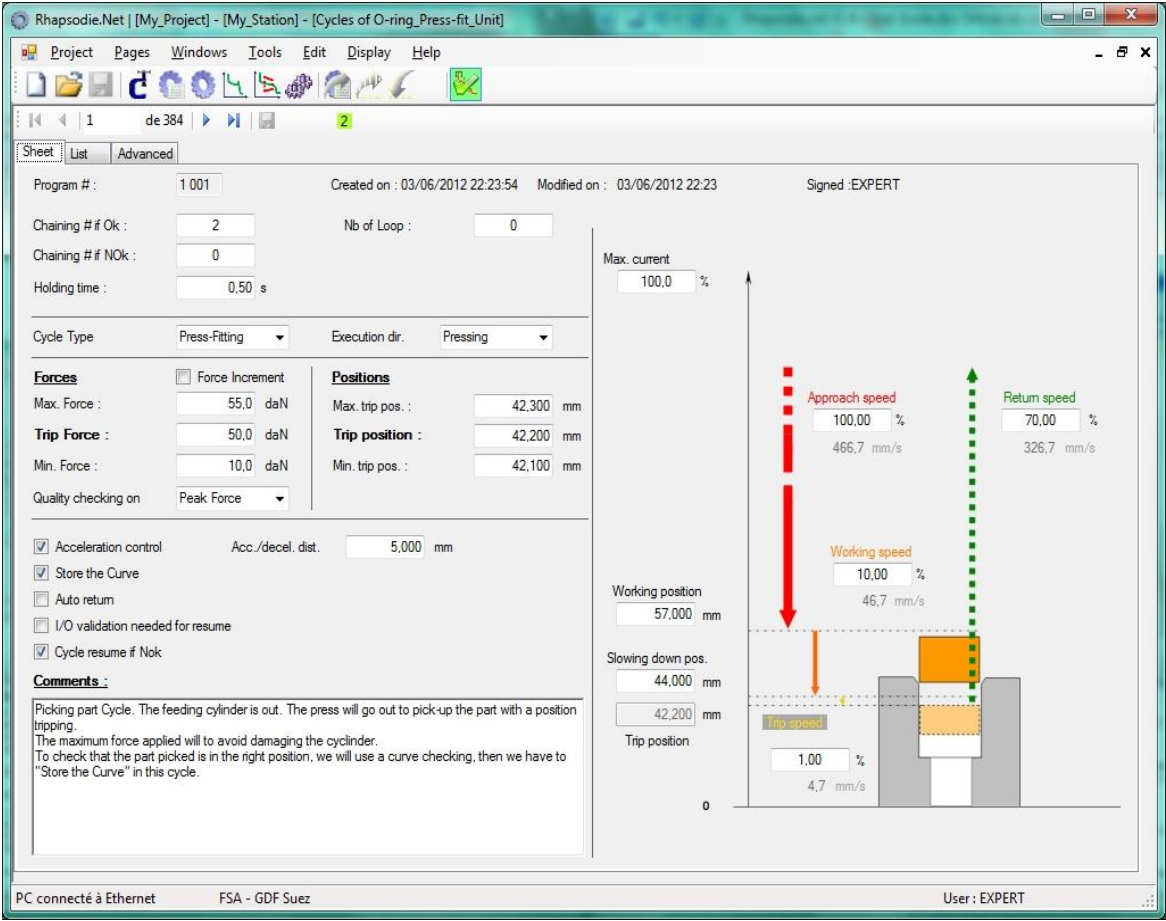
The **minimum** speed which can be programmed is **1%** of the maximum speed.

The **maximum** speed which can be programmed is **10 %** of the maximum speed.

Note: if the speed is too low, the MVAT card may output fault no. 51. ➔ Increase this speed

5.4.2 Cycles

When you select the Setpoint/Cycles menu, or click the  button, the Cycles page appears:



Rhapsodie.Net | [My_Project] - [My_Station] - [Cycles of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

de 384

Sheet List Advanced

Program #: 1 001 Created on : 03/06/2012 22:23:54 Modified on : 03/06/2012 22:23 Signed : EXPERT

Chaining # if Ok : 2 Nb of Loop : 0

Chaining # if Nok : 0

Holding time : 0.50 s

Cycle Type: Press-Fitting Execution dir.: Pressing

Forces ☐ Force Increment

Max. Force : 55.0 daN

Trip Force : 50.0 daN

Min. Force : 10.0 daN

Quality checking on: Peak Force

Positions

Max. trip pos. : 42,300 mm

Trip position : 42,200 mm

Min. trip pos. : 42,100 mm

☒ Acceleration control Acc./decel. dist.: 5,000 mm

☒ Store the Curve

☐ Auto return

☐ I/O validation needed for resume

☒ Cycle resume if Nok

Comments :

Picking part Cycle. The feeding cylinder is out. The press will go out to pick-up the part with a position tripping.
The maximum force applied will avoid damaging the cylinder.
To check that the part picked is in the right position, we will use a curve checking, then we have to "Store the Curve" in this cycle.

Max. current: 100.0 %

Approach speed: 100.00 % 466.7 mm/s

Working speed: 10.00 % 46.7 mm/s

Return speed: 70.00 % 326.7 mm/s

Working position: 57,000 mm

Slowing down pos.: 44,000 mm

Trip position: 42,200 mm

Trip speed: 1.00 % 4.7 mm/s

PC connecté à Ethernet FSA - GDF Suez User: EXPERT

5.4.2.1 Description of fields

Chaining # if Ok: At the end of this cycle, if you want MVAT to chain to another "SOFT chaining" cycle, enter the Cycle number here (1 to 384).

The current cycle number is of course not allowed (a cycle cannot loop back on itself!).

Chaining may be contingent on a validation by the PLC (in this case check the "I/O validation needed for resume" box)
Warning, if the current cycle does not execute successfully, chaining will ONLY be carried out if "Cycle resume if Nok" is checked.

By **Default**, the pre-entered value is **0** which means NO CHAINING

Chaining # if NOK: If the current cycle does not execute successfully but nevertheless you still want MVAT to chain to another "SOFT chaining" cycle, enter the Cycle number here (1 to 384).

The current cycle number is of course not allowed (a cycle cannot loop back on itself!).

Chaining may be contingent on a validation by the PLC (in this case check the "I/O validation needed for resume" box)

By **Default**, the pre-entered value is **0** which means NO CHAINING

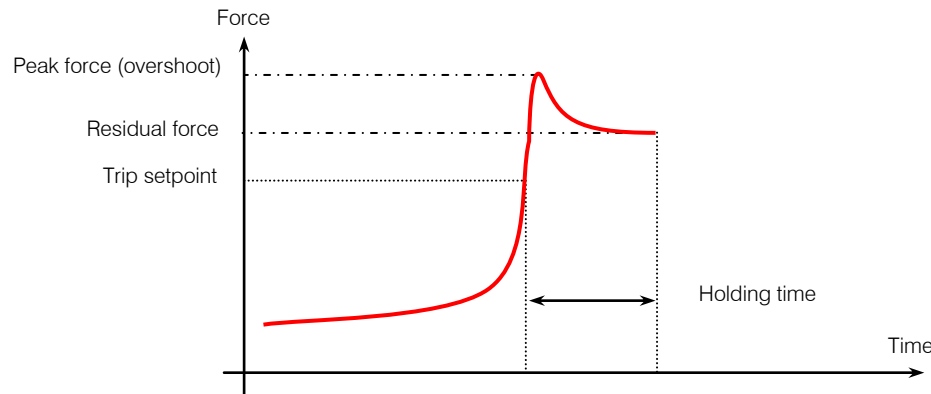
Nb of Loop: If you want to repeat a chain x times (e.g. running in a slide by executing Cycle 1 ⇒ Cycle 2 ⇒ 1 ⇒ 2 ⇒ 1 ... x times), enter x in this field for the 1st cycle of the loop.

You can loop more cycles. For example, you want to loop a chain 10 times 1⇒2⇒3⇒4⇒1⇒2... To do this enter 10 in Nb of Loop for Cycle 1 only.

By **Default**, the pre-entered value is **0** which means: NO LOOPING

The **maximum** number depends on the number of cycles in the loop, as **the MVAT can only chain 100 cycles** in the same sequence.

Holding time: At the end of a cycle, at the moment the pin comes to a stop depending on the speed and the mechanical stiffness of the assembly, there may be an "overshoot" of the force due to inertia. Two forces are then used for checking the final force: the peak force and the residual force.



The holding time therefore allows the mechanics to "relax".

By **Default**, the pre-entered value is **0.00**. 0.5 secs is usually sufficient to relax the mechanics.

The **maximum** programmable value depends on the type of pin, the overall cycle time and the force applied relative to the nominal force of the press. In general, 1.5 secs is the maximum. Beyond this, the pin applies the force continuously and the motor will overheat. Time must therefore be allowed for it to cool down.

Cycle Type: Allows you select the cycle time from: (the graphical design change depending the choice)

- **Press-Fitting:** Standard press-fitting cycle. The programmed positions are absolute.
- **Acquisition:** Same as Press-Fitting BUT the trip position is kept in memory to enable DIFFERENTIAL CHECKS to be carried out on position in the following cycles (whether or not within the same sequence) (see advanced functions)
- **Positioning:** Press-fitting cycle where ALL programmed positions are DISTANCES. Positioning is then relative to the preceding cycle.

Note: A sequence CAN NEVER start with a positioning cycle.

Execution dir.: Allows you select the working direction: (the graphical design change depending the choice)

- **Pressing:** The press shaft will exit and views a shaft pressing force as a "positive" force.
- **Pulling:** The press shaft will return and views a shaft pulling force as a "positive" force.

Note: A sequence CAN NEVER start with a pulling cycle.

Note: FABRICOM pins work both in pressing and pulling mode without force limitation.

Trip force: This is the Force setpoint which will stop the press if the trip position has not yet been reached.

NEW : If the checkbox « Force Increment » is checked, the entered force here corresponds to a complementary force that the press will add to the last force reached (the one of the last cycle).

The **minimum** configurable force is **1%** of the nominal force for the press. Warning, to ensure accuracy in stopping under force and reading the force, this value must be less than **10%** of the nominal force of the press.

The **maximum** configurable force is the Pressing calibration force (see Specifications page).

WARNING : In traction mode, this is that value which is used as safety force during approach phase.

Max. and Min. force: These are the acceptance tolerances of the force at the end of execution (Peak force OR Residual force depending on the "Quality checking on" selection).

By **Default**, the pre-entered value is **0.0 daN** which means: NO CHECKING

Quality checking on: see above. Depending on the selection. in the results block (see section "Journal 232"), either the Peak force, or the Residual force will be monitored with regard to quality information (OK, TB, TL).

Trip position: This is the Position setpoint which will stop the press if the trip force was not reached beforehand.

There is no minimum or maximum value, this depends on the geometric identification learnt by the MVAT during calibration.

PLEASE NOTE: The value **0.000** MEANS "Position NOT programmed"

Trip position Max. and Min.: These are the acceptance tolerances for the position at the end of execution.

By **Default**, the pre-entered value is **0.000 mm** which means: NO CHECKING

Max. current: This is the maximum current that the MVAT will allow the servo to carry out its requests. If this value is too low relative to the work requested (application of force, acceleration, deceleration), the current limitation may cause undesirable behaviours:

- the shaft remains in support position until the max. cycle time has elapsed
- the shaft accelerates slowly
- the shaft brakes incorrectly in the deceleration phase.

By **Default**, the pre-entered value is **100.0 %**. This value may be reduced depending on the work requested, but be careful of the acceleration and deceleration phases which often necessarily consume more energy due to the cycle time, even for cycles where a very low force is applied.

Speeds and position: The cycle page diagram in Rhapsodie represents each of these parameters.

The default values are:

- **Approach speed: 100%** (fast approach: no time to lose! You must, however, take into account accelerations, the velocity of the FSA pins and the weight of the tool carried)
- **Working speed: 30%** (we are press-fitting, some energy is required!)
- **Trip speed: 5%** (if we want to stop cleanly and minimise overshoot, or ensure the trip position is accurate, we need to finish gently!)
- **Return speed** (ditto Approach speed)

Note: As most of the FSA pins are fast (from 330 mm/sec to 700 mm/sec), the speed entered as a percentage is translated into mm/sec for illustrative purposes.

The **Approach position** represents the position at which the Approach speed changes to the Working speed.

The **Slowing down position** represents the position at which the Working speed changes to the trip speed.

Acceleration control and Acc./decel. dist.: To save on mechanics, and taking account of the speed and sensitivity of FSA pins, it is recommended to introduce acceleration and deceleration ramps by enabling this function.

By **Default**, the pre-entered value is **5.000 mm**. This means that the MVAT will carry out the change of speed over 5 mm of movement.

Activity of this ramp:

<i>Change from:</i>	<i>to:</i>	<i>Ramp enabled?</i>
Start speed*	Approach speed	YES
Approach speed	Working speed	YES
Working speed	Trip speed	YES
Trip speed	Stop	NO
Stop	Return speed	YES
Return speed	Start speed*	YES

*(see Advanced Functions - Specifications Page)

Store the Curve: If during the movement described by the current cycle, you wish to store the force as a function of displacement, just check this box AND allocate a curve program (PROFILE) to the sequence which manages the execution of this cycle.

Auto Return: if this cycle is the last in the sequence you can either:

- check this box and MVAT manages the return to the origin
- request SOFT chaining on special cycle 513
- use HARD chaining by the PLC which will request the same special cycle 513.

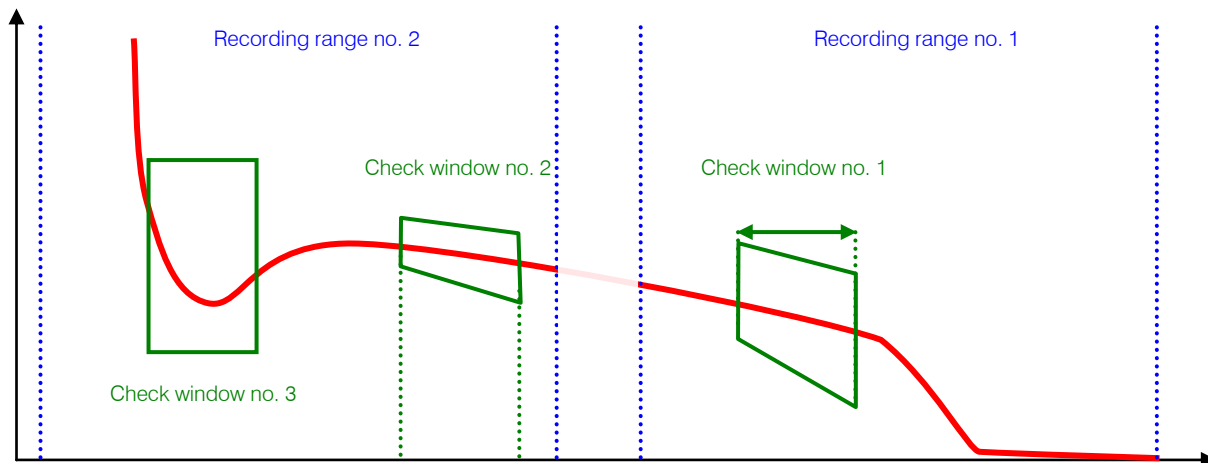
I/O validation needed for resume: if this box is checked, the MVAT awaits synchronisation from the PLC to chain to the following cycle. Otherwise, chaining will be carried out directly.

Cycle resume if Nok: if this box is checked, the MVAT will continue with the chains even if the cycle just executed was not OK. The quality of this cycle is thus forced to OK in order to continue. However, in the result block, the actual quality will be displayed.

5.4.3 Profiles

When you select the Setpoint/Profiles menu, or click the  button, the Profiles page appears:

This menu allows you to carry out an advanced curve check. To configure this check, 5 force recording ranges are available. Once the recording ranges have been defined, up to 5 check windows in total may be configured split across the recording ranges.



Positioning modes of recording ranges:

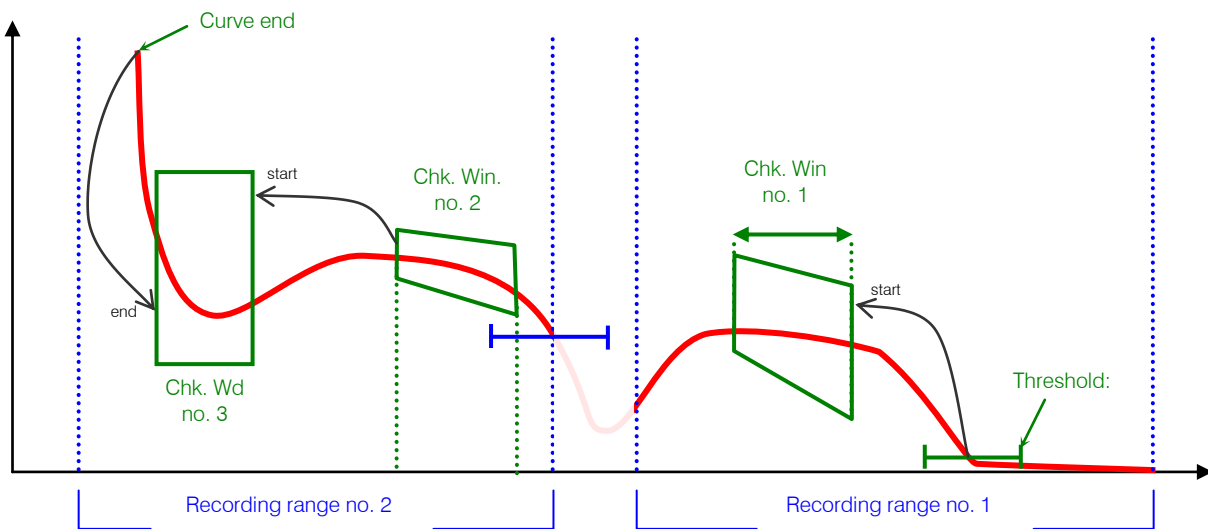
- Absolute Start, Absolute End
- Start on force threshold and End at a fixed width from the start
- Start on External signal and End at a fixed width from the start

Positioning modes of check windows:

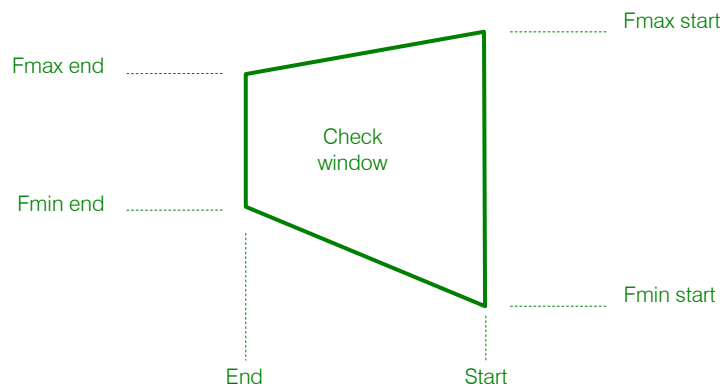
- Start of Window:
 - Absolute
 - Fixed width relative to the end
 - On force threshold exceeded in increasing direction
 - On force threshold exceeded in increasing direction
 - Relative to the end of the preceding window
- End of Window:
 - Absolute
 - Fixed width relative to the start
 - On force threshold exceeded in increasing direction
 - On force threshold exceeded in increasing direction
 - Relative to the start of the next window
 - Relative to the last point recorded in the window

Example:

- **Recording range 1:** Absolute Start, Absolute End
 - **Check window no. 1:**
 - Start of force threshold
 - End defined by Fixed width
- **Recording range 2:** Start of force threshold - Fixed width
 - **Check window no. 2:**
 - Absolute Start and End
 - **Check window no. 3:**
 - Start relative to the end of window no.2
 - End relative to the end of the curve



4 force values can be configured for each check window giving a trapezoidal shape:



Control modes:

A control mode is selected for each check window:

Inclusion mode:

In this mode, all the points on the curve must be inside the window.

The "Strict Inclusion" option invalidates the point on the end of the window.

Increasing mode

In this mode, in addition to an inclusion, a check is made that the start point of the window is less than that of the end.

Decreasing mode

In this mode, in addition to an inclusion, a check is made that the start point of the window is greater than that of the end.

Peak mode

In this mode, in addition to an inclusion, a check is made that the maximum of the curve corresponds to a peak (increasing before the peak, then decreasing afterwards).

Trough mode

In this mode, in addition to an inclusion, a check is made that the minimum of the curve corresponds to a trough (decreasing before the trough, then increasing afterwards).

Mean mode (static)

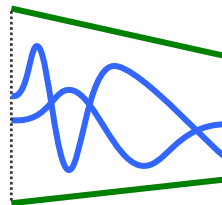
In this mode, a check is just made that the mean of the curve between the start and the end of the window is between a max and a min.

Dynamic mode

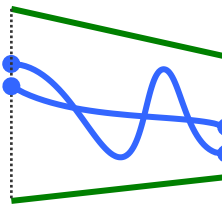
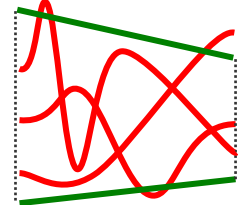
In this mode, the dynamic mean is calculated and a check is made that the new curve is included in the check window.

OK ✓

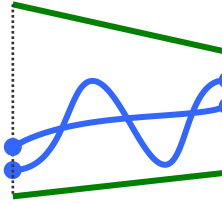
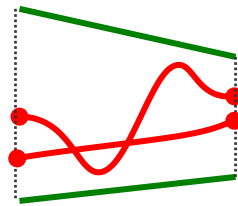
NOK ✗



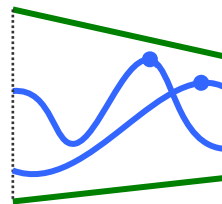
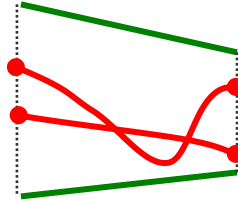
Inclusion



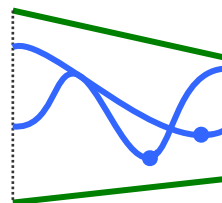
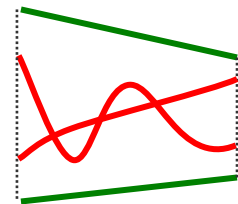
Increasing



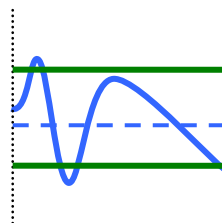
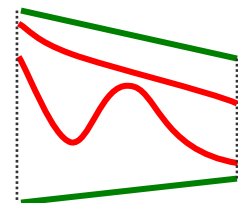
Decreasing



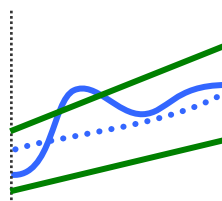
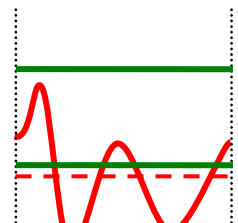
Peak



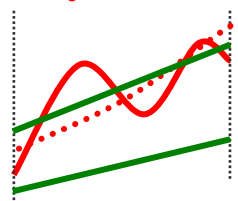
Trough



$\bar{x}_{\max}$
Average
Static
 $\bar{x}_{\min}$

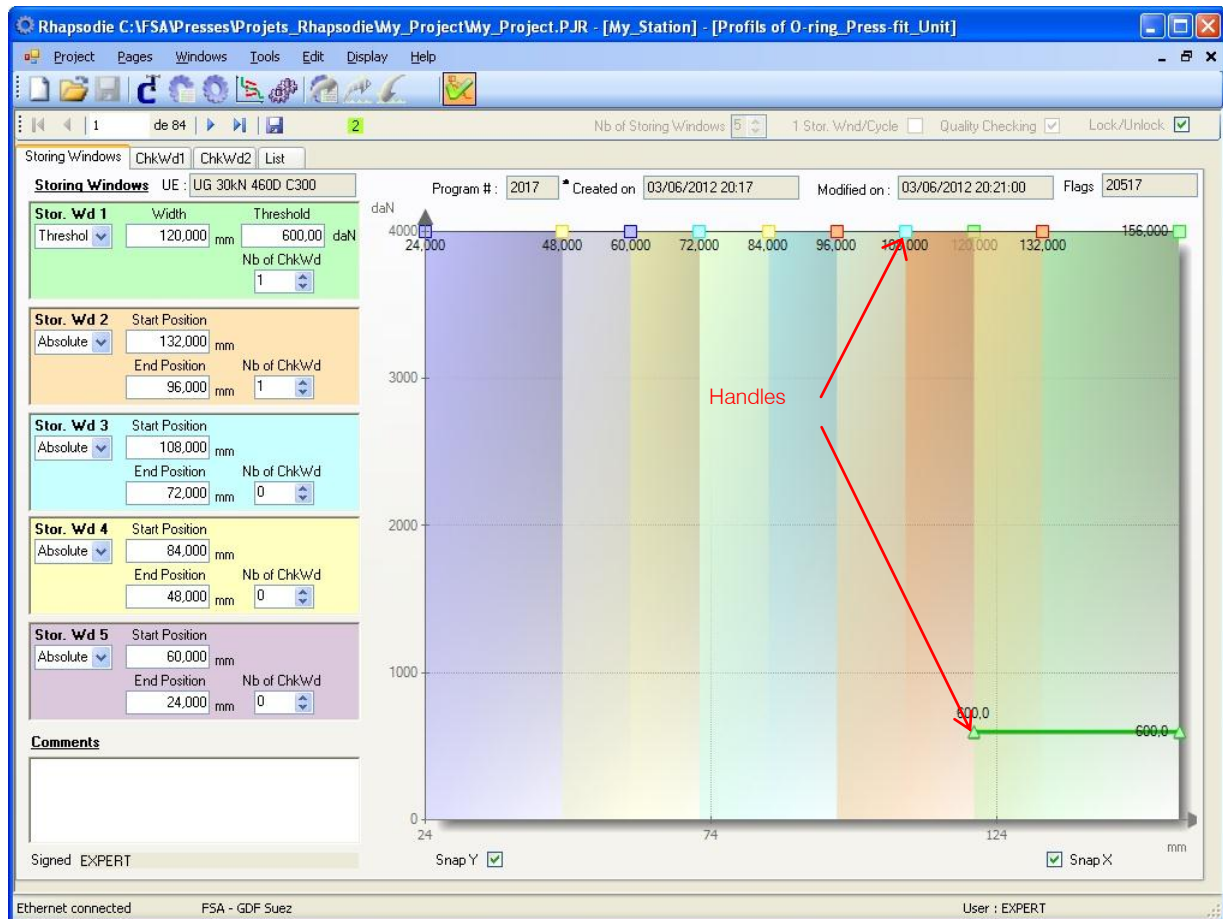


Average
Dynamic



5.4.3.1 Configuring recording ranges

The programs are numbered from 2017 to 2099 (**Warning**, the scroll bar numbers them from 1 to 84). The screens on this page also allow the user to carry out configuration by entering data as well as moving points using the mouse.



To the left, the boxes allow the user to enter the start and end positions of the recording ranges.

To remove or add a recording range, you must uncheck the "Lock/Unlock" box to increase or decrease the number of ranges.



The "1 Stor. Wnd/Cycle" box causes a new storage range to be used at each new cycle executed (and where curve storage is required).

The "Quality Checking" box ensures that the quality of the curve check is taken into account. If this box is not checked, the quality of the curve check will always be OK.

The drop-down menu present in each "Stor. Wd X" area allows you to select the start mode for storing the force:

If "Absolute" if chosen, the Start and End positions must be entered.
If "Threshold" is chosen, a new "Threshold" box is displayed to enter the threshold force from which storage is to start. The Threshold force then appears on the graph.

If "Trigger" is selected, force storage will be tripped by an ON/OFF input to the MVAT card.
For both the last 2 modes, "Start position" and "End position" are replaced by "Width".

Repeatedly clicking a "Stor. Wd X" area alternately shows/hides the corresponding range on the graph.

The graph is automatically updated when values are entered in the boxes.
Similarly, if you move the "handles" available on each of the recording ranges, the corresponding value in the entry box is updated:

The 2 boxes "**Snap Y**" and "**Snap X**" provide a coarser displacement increment on the handles.

For each recording range, the "Nb of ChkWd" field defines the number of check windows which will belong to this recording range.

In total, a maximum of 5 check windows may be distributed across the Recording ranges.

To the side of the "**Storing windows**" tab, there are as many "**ChkWd**" tabs as requested check windows.

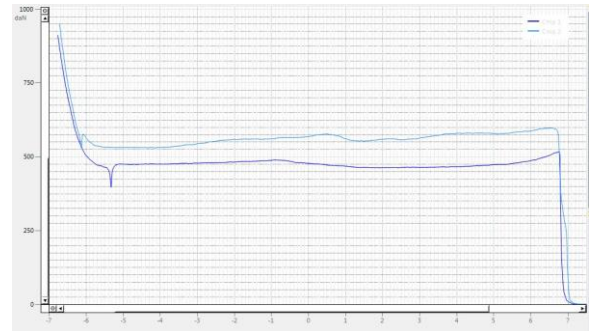
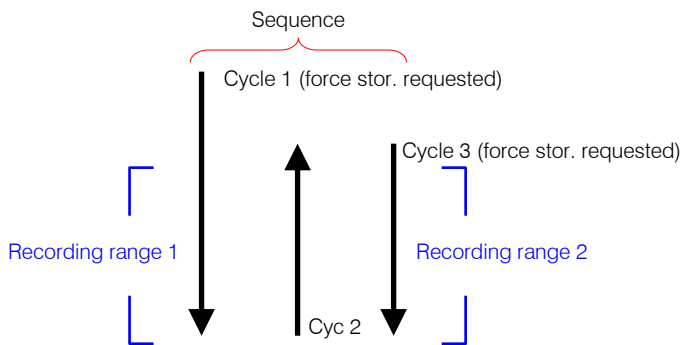
To configure the check windows, just click on the corresponding tab.

Configuration essentials: (to avoid execution errors)

- For a **pressing** cycle, the start position must be GREATER than the end position
- For a **pulling** cycle, the start position must be LESS than the end position

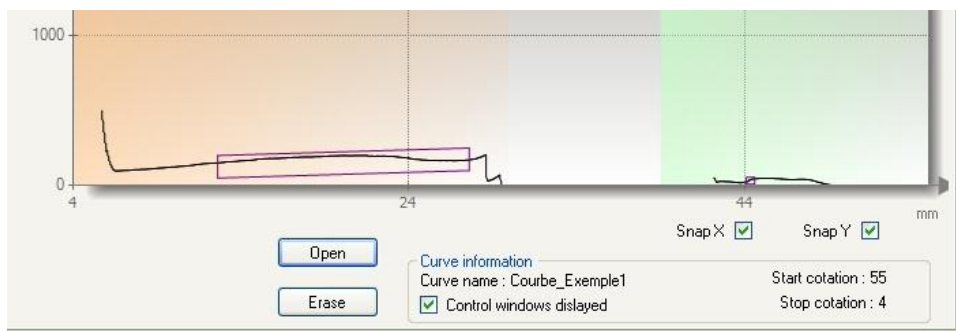
If 2 pressing cycles travel successively over the same area, it is possible to program 2 identical recording ranges:

e.g. Sequence of 3 cycles during which 2 identical split pins are fitted into a product at 2 different locations.



5.4.3.2 Using an envelope Curve to place the Recording Ranges (Storing Windows)

Since the version 1.5.0.00 of Rhapsodie, you can open a curve into profiles programming to help you to place the recording ranges and the check Windows :



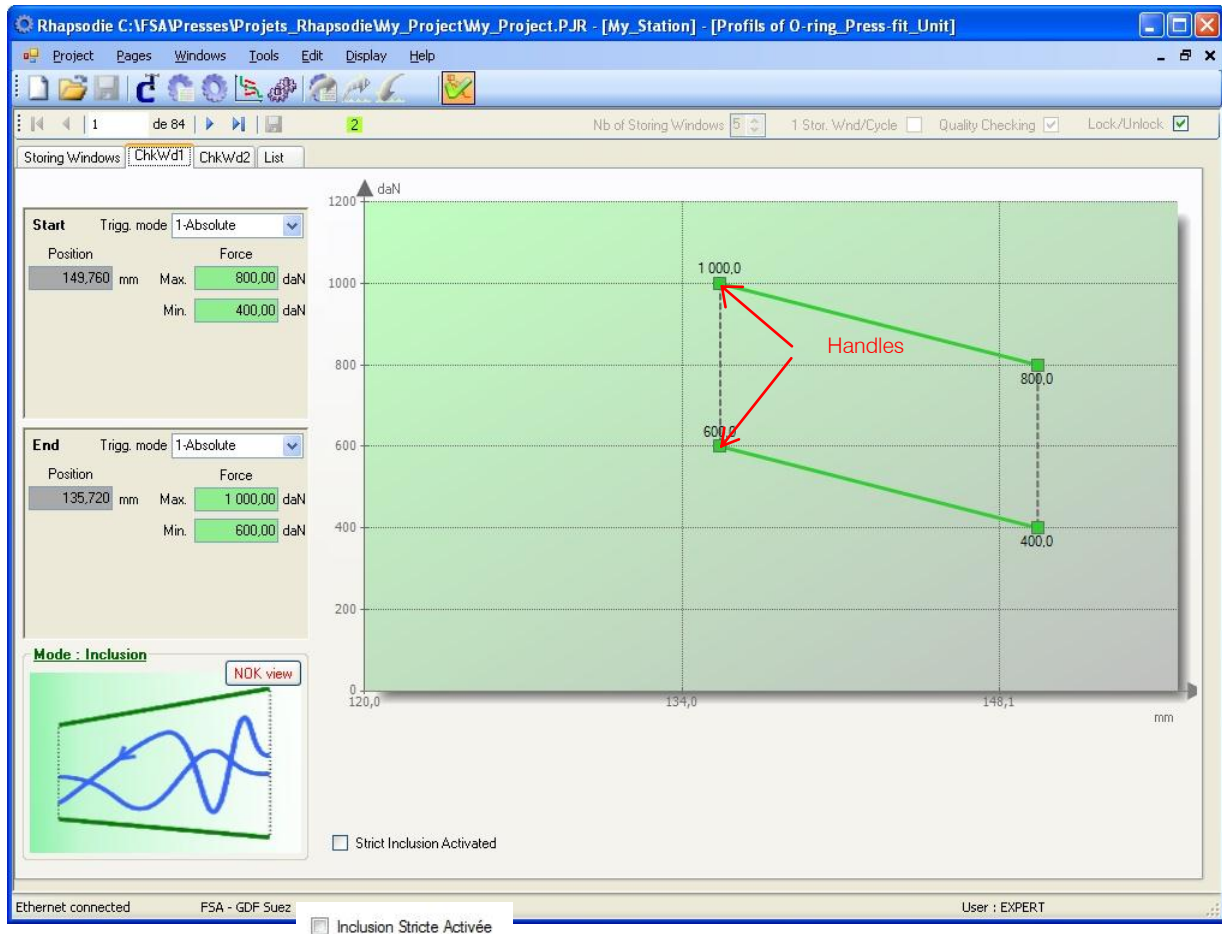
The start and the end of storing of the curve are displayed to help you to adjust the beginning and the end of the recording ranges.

You can either open a standard curve, or an envelope curve generated by VisuCourbes.Net.

On the position axis, an auto-scale is done including the curve and your recording ranges.

On the Force axis, the scaling is done on the nominal Force of the sensor of the press

5.4.3.3 Configuring check windows

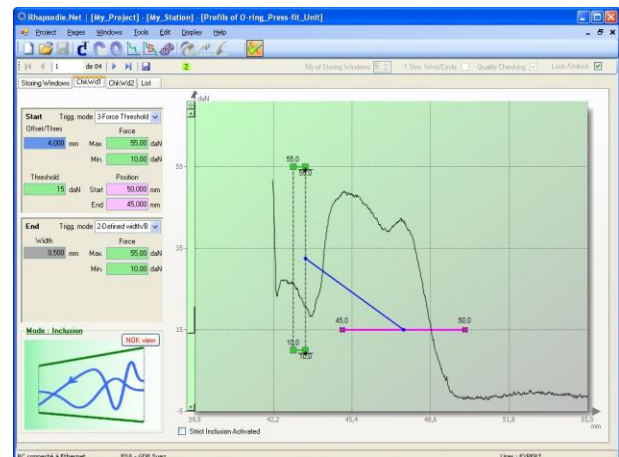
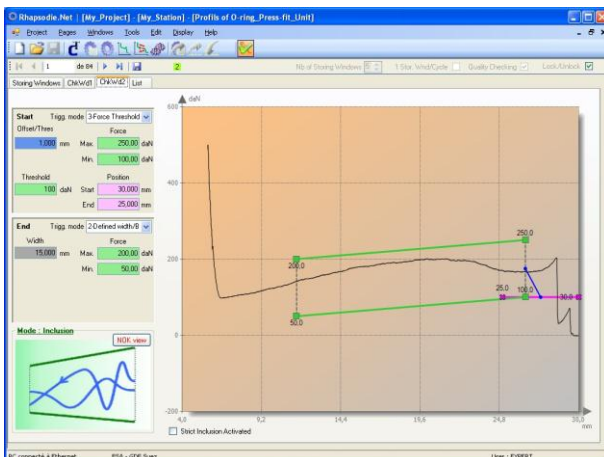


There are 4 areas in this screen:

- the **"Start"** area used to configure the start of the window with regard to both position and force
- the **"End"** area used to configure the end of the window with regard to both position and force
- the **"Mode"** area which defines the type of check to be carried out in this window.
- the graph area which gives a dynamic representation of the configuration and has the same background colour as the recording range to which it applies. The maximum and minimum positions of the graph relate to the start and end positions of the recording range.

Since the version 1.5.0.00 of Rhapsodie.Net, if you have opened a curve into the "Storing Windows" sheet, you will see in each Check Window the part of this curve :

In our example in 4.4.3.2, there is 2 Check Windows :



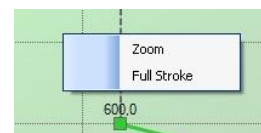
Graph manipulation

The graph and the entry fields are fully interactive through the handles available on the graph (4 angles in the window and the bounds of the 2 force thresholds).

Modifications made to the entry fields are reproduced directly in the graph, and manipulating the graph updates the entry fields.

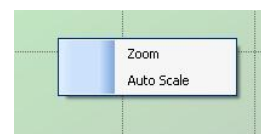
If you right-click inside the graph, a pop-up menu appears:

You can zoom in on the graph, or display it in full scale (the Y scale is not affected, but the X range takes in the full stroke of the pin).



On the next right-click, the pop-up menu becomes:

"Auto Scale" returns to the initial window (the Y axis starts from 0 daN and goes up to the nominal force for the pin, on the X-axis, the area related to the recording range is displayed)



In Zoom mode, scroll bars appear at the sides which allow you to move around the graph, and the symbols  allow you to zoom out (the various Zooms are saved)

Trip modes for the start and end of the window:

This allows the start and end of the window to be positioned.

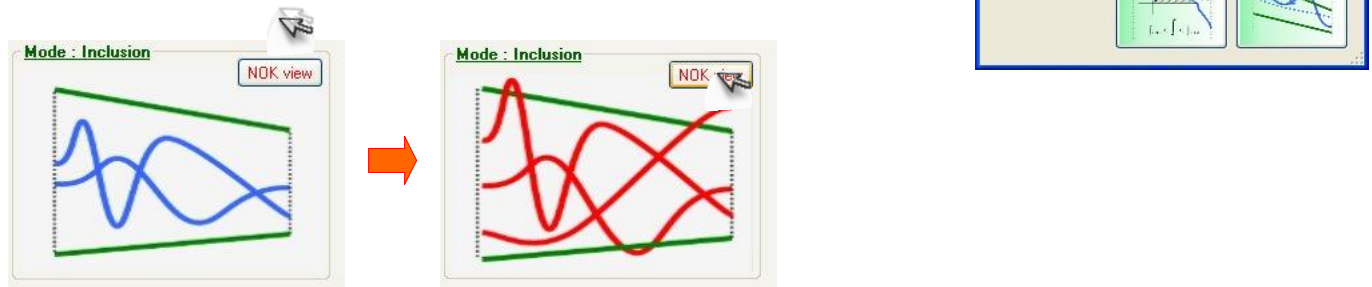
Start		End	
Mode	Values to enter	Mode	Values to enter
Absolute	Start position	Absolute	Enter the end position
Fixed width/end	Window width	Fixed width/start	Window width
Force threshold +	Offset, start position and end threshold, Tripping force	Force threshold +	Offset, start position and end threshold, Tripping force
Force threshold -	Offset, start position and end threshold, Tripping force	Force threshold -	Offset, start position and end threshold, Tripping force
End of prev. window	Offset		
Linear regression	Offset, start position and end of observation	Curve end	Offset

Some examples of the various programs are shown on the next page.

Selection of the Checking mode

If you click on the **"Mode"** button, the following screen is displayed and enables you to select the type of check to be carried out in the window by a single click on the desired button.

Then, with the model selected, passing the mouse over the **"NOK View"** button, shows an example of a failed check in place of the icon showing a successful check.



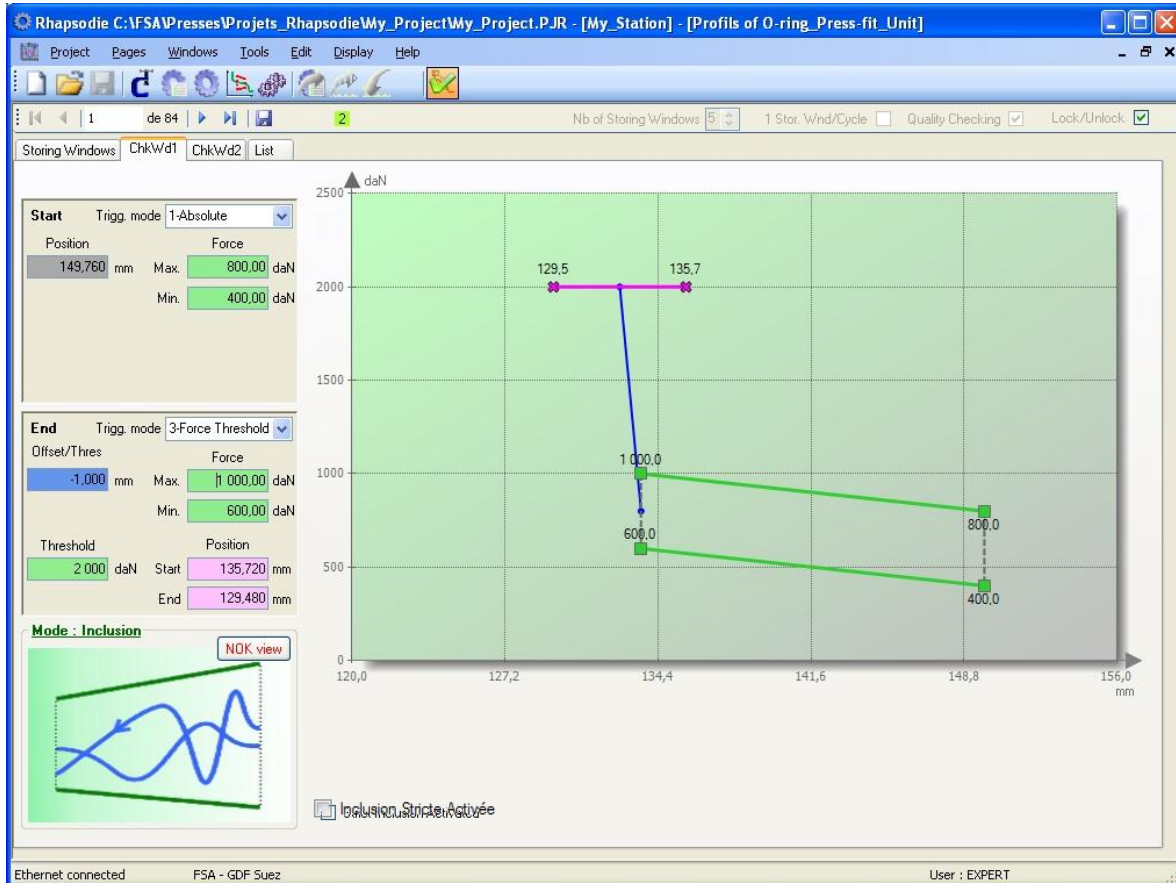
The **"Strict Inclusion Activated"** checkbox adds the Strict Inclusion criterion to the Inclusion check. In this mode, the curve may not exit from the window by the "End of window" edge, or check will be declared as Not OK.

☐ Strict Inclusion Activated

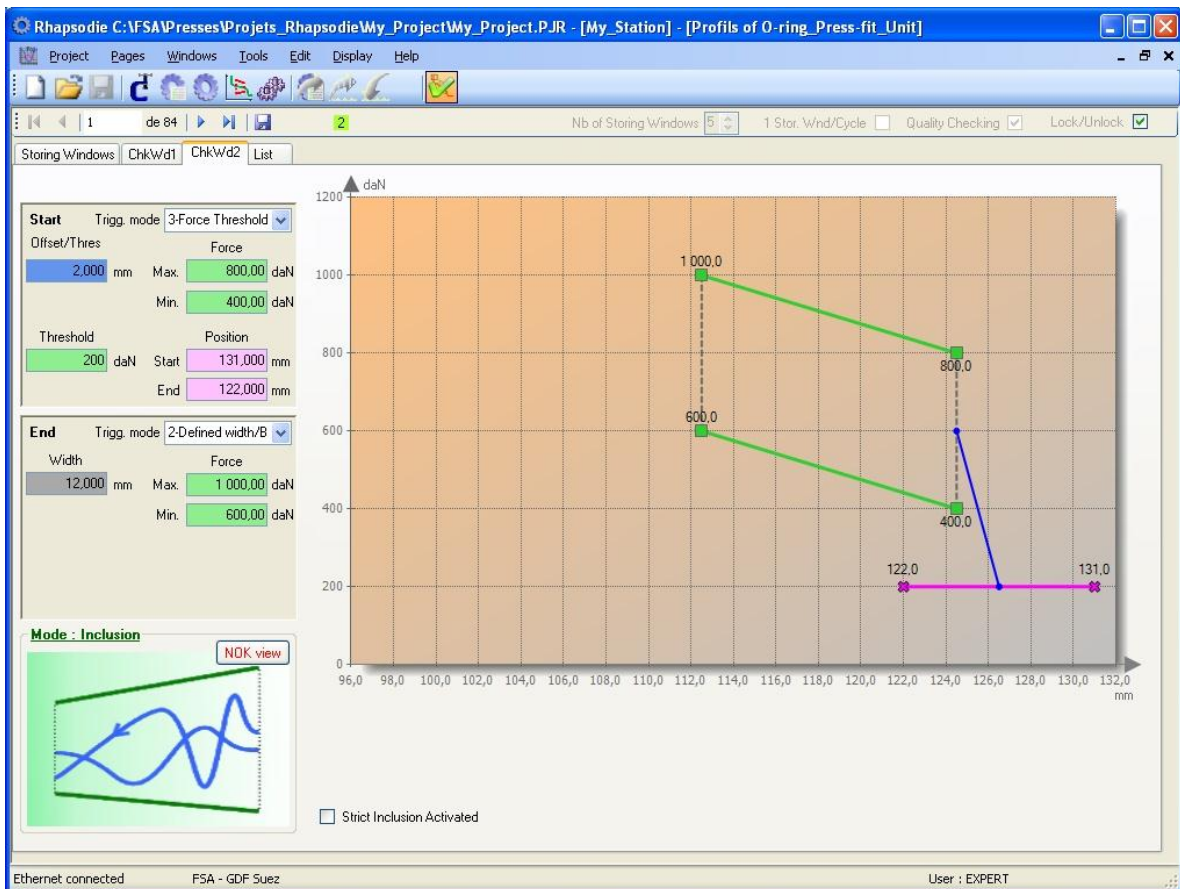
the

This mode makes it possible for example to check that a curve terminates within the window.

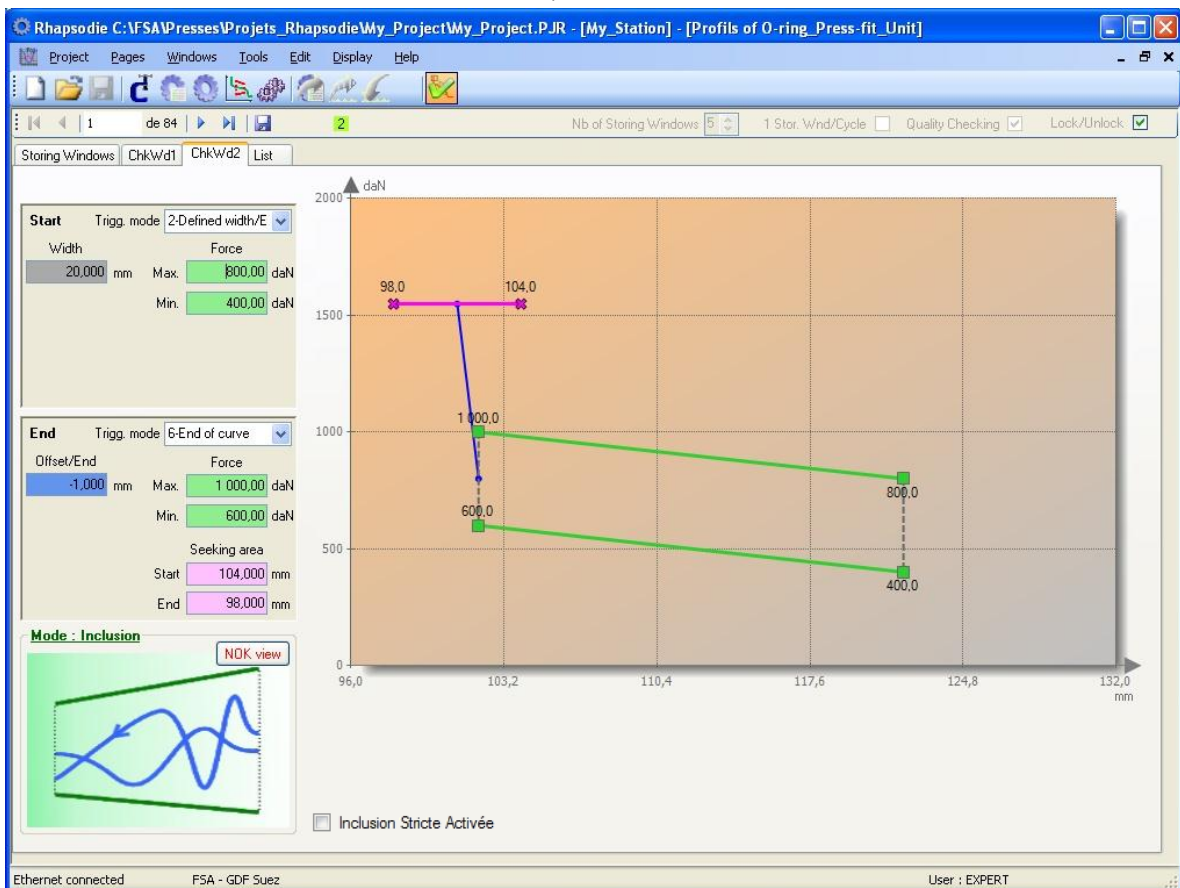
Programming examples: Absolute start and End on Force Threshold



Example no. 2: Start on force threshold and End at a fixed width from the start



Example no. 3: Start fixed width from the end and End placed relative to the end of the curve.



Configuration essentials: (to avoid execution errors)

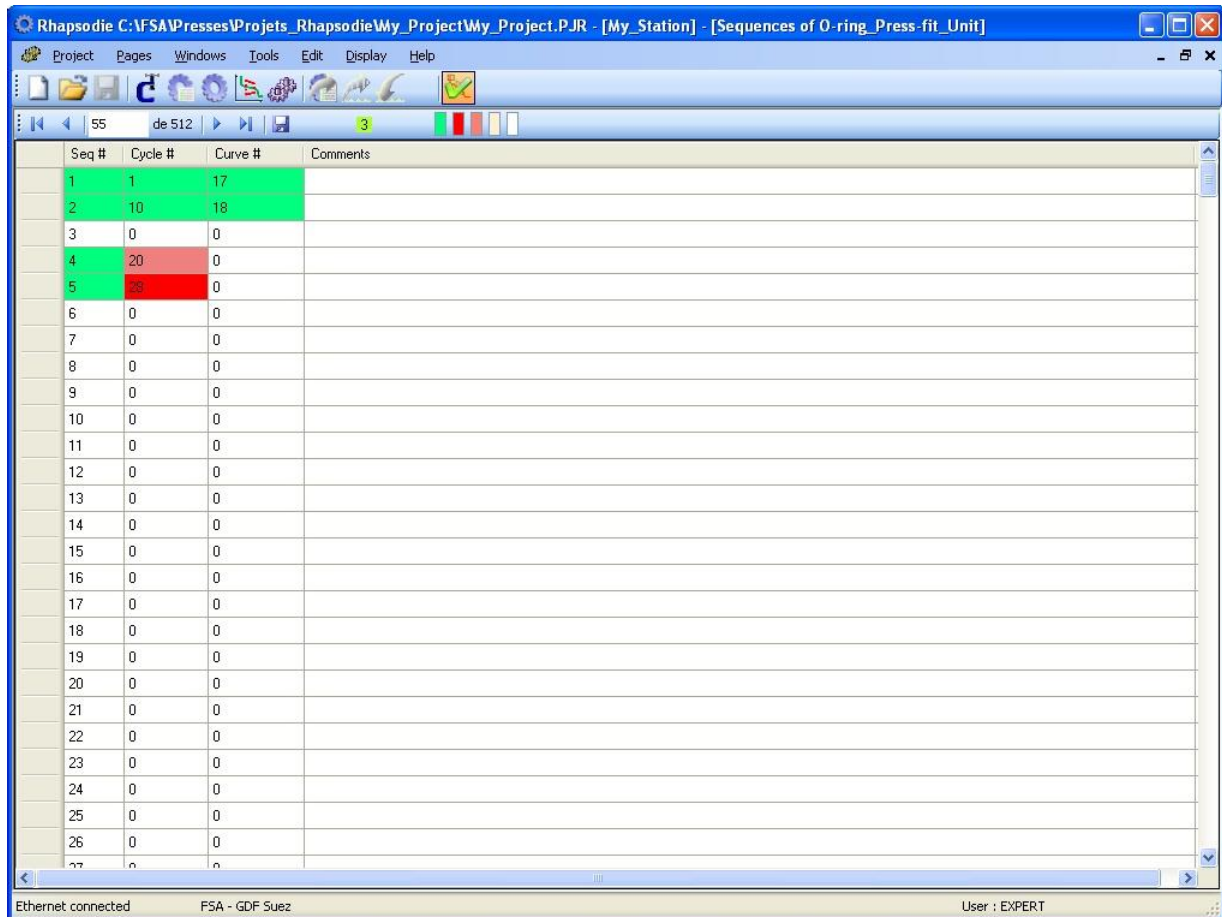
- For a **pressing** cycle, the start positions (start of window and threshold starts) must be GREATER than the end position (window end and threshold ends)
- For a **pulling** cycle, the start positions (start of window and threshold starts) must be LESS than the end positions (window end and threshold ends)
- The offset is signed: +5 mm means: the window starts 5 mm AFTER the trip, -5 mm means: the window starts 5 mm BEFORE the trip
- The width MUST BE POSITIVE (Fixed Width mode)
- Depending on the trip mode, the values of the active "Start" and "End" positions must be within the recording range (the graphical representation allows this to be checked simply).
- All Force values must be less than the press calibration force
- It is prohibited to select a "Fixed width/End" start trip mode and a "Fixed width/start" end trip mode

The List tab shows all advanced curve programs in the same way as in the other pages.

5.4.4 Page: "Sequences"

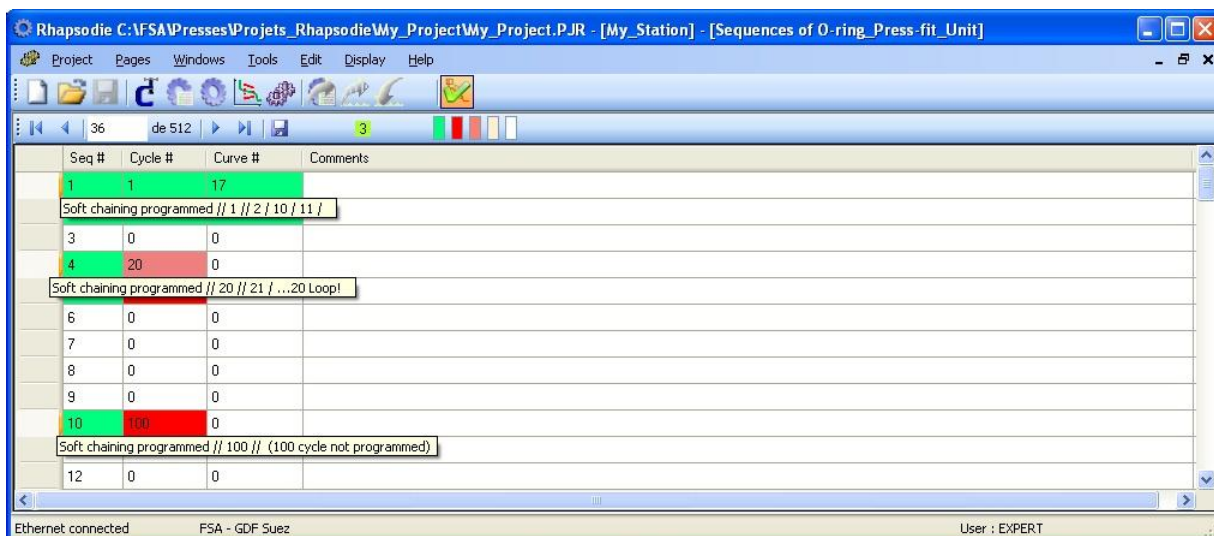
When you select the Setpoint/Profiles menu, or click the  button, the Profiles page appears:

This menu allows you to allocate the number of the 1st cycle executed to a sequence as well as the storage program number (PROFILE).



Seq #	Cycle #	Curve #	Comments
1	1	17	
2	10	18	
3	0	0	
4	20	0	
5	25	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	
10	0	0	
11	0	0	
12	0	0	
13	0	0	
14	0	0	
15	0	0	
16	0	0	
17	0	0	
18	0	0	
19	0	0	
20	0	0	
21	0	0	
22	0	0	
23	0	0	
24	0	0	
25	0	0	
26	0	0	
27	0	0	

It is possible to view the cycle chain (soft only) by pointing to the row header of a sequence:

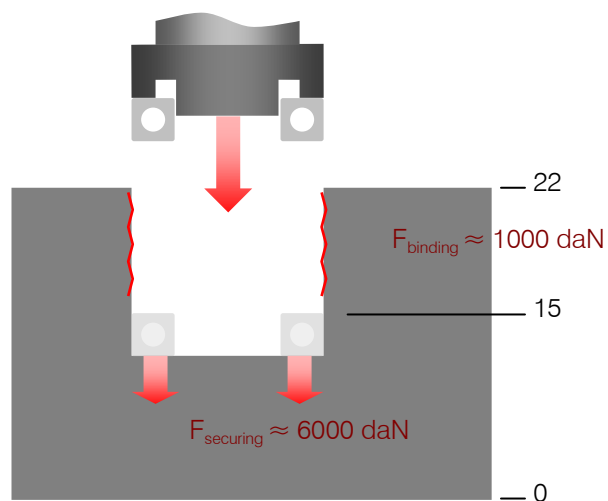


Seq #	Cycle #	Curve #	Comments
1	1	17	
2	10	18	
3	0	0	
4	20	0	
5	25	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	
10	0	0	
11	0	0	
12	0	0	

For the meaning of the colour code, see the section entitled "Use of List pages\Consistency"

5.5 Examples of conventional programs

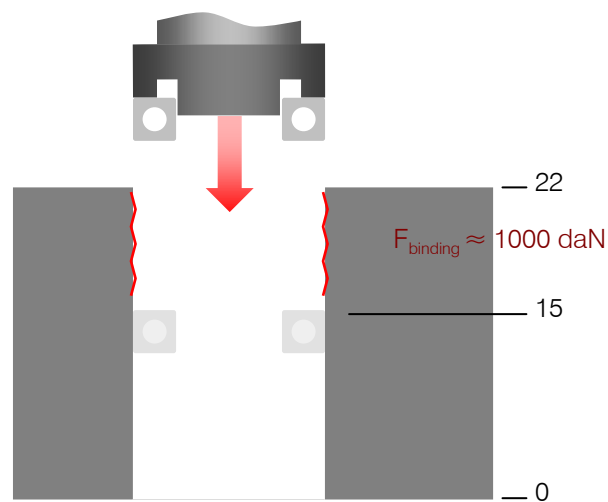
5.5.1 Press-fitting



Forces		Positions	
Max. Force :	6 100,0 daN	Max. trip pos. :	15,050 mm
Trip Force :	6 000,0 daN	Trip position :	14,000 mm
Min. Force :	5 900,0 daN	Min. trip pos. :	14,950 mm
Quality checking on	Peak Force		

Programming of the related cycle

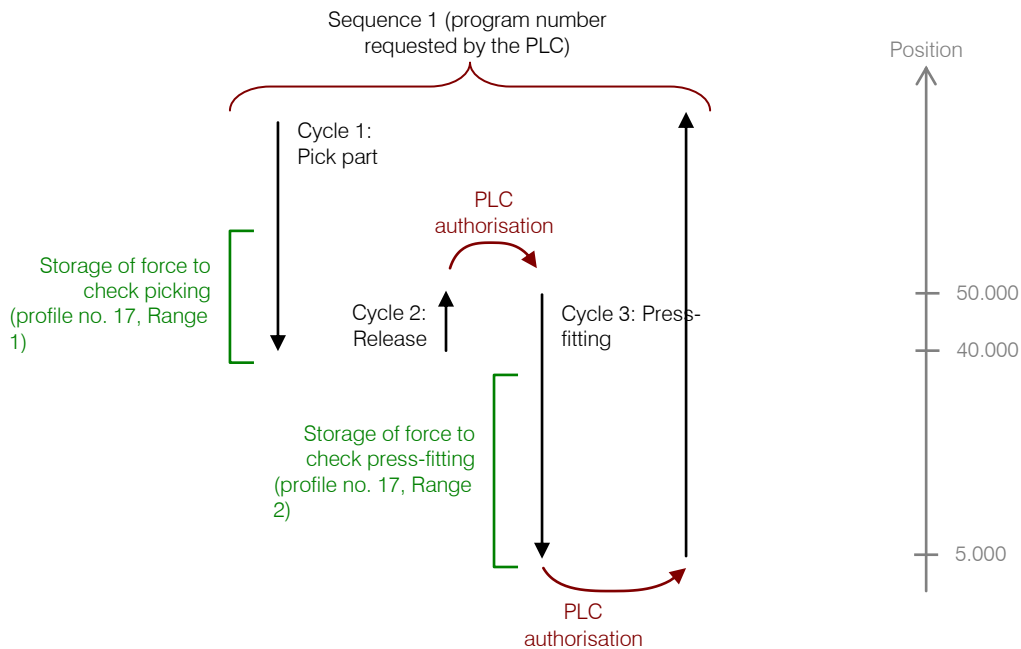
5.5.2 Interference fitting



Forces		Positions	
Max. Force :	1 500,0 daN	Max. trip pos. :	15,050 mm
Trip Force :	2 000,0 daN	Trip position :	15,000 mm
Min. Force :	600,0 daN	Min. trip pos. :	14,950 mm
Quality checking on	Peak Force		

Programming of the related cycle

5.5.3 Sequence of 3 cycles with return by PLC and Curve check on Cycles 1 and 3



In this example, the press descends to position 40, picks a part of height 15 mm then goes back up with the part 10 mm, relative movement. The feeding cylinder can then return and the PLC gives the order to the press to continue the sequence. The press then descends to press-fit the part under force (the position reached is about 5 mm). We shall present all the Cycle, Profile and Sequence pages needed to carry out this process as well as the curve obtained (the comments give more information on certain choices

Cycle 1 programming

Cycle 2 programming

Rhapsodie.Net | [My_Project] - [My_Station] - [Cycles of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

Sheet List Advanced

Program # : 1 002 Created on : 03/06/2012 22:23:54 Modified on : 03/06/2012 22:23 Signed : EXPERT

Chaining # if Ok : 3 Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0.50 s

Cycle Type Positioning Execution dir. Pulling

Forces ☐ Force Increment **Positions**

Max. Force : 0.0 daN Max. trip pos. : 0.000 mm

Trip Force : 10.0 daN **Trip Distance** : -10.000 mm

Min. Force : 0.0 daN Min. trip pos. : 0.000 mm

Quality checking on Peak Force

☒ Acceleration control Acc./decel. dist. 5.000 mm

☐ Store the Curve

☐ Auto return

☒ I/O validation needed for resume

☒ Cycle resume if NOK

Comments :

Here, we go back for 10mm in relative mode to let the cylinder go back.
A relative movement has to be signed. We go back => -10mm. The same for the Working and Slowing down distance : -5mm and -8mm.

At the end of this cycle, as we have to wait for the PLC to inform that the cylinder is back, we checked the "I/O validation needed for resume".

Max. current 50.0 %

Trip Dist. -10.000 mm

Slowing down Dist. -5.000 mm

Working Dist.

Trip speed 5.00 % 23.3 mm/s

Return speed 70.00 % 326.7 mm/s

Working speed 10.00 % 46.7 mm/s

Approach speed 30.00 % 140.0 mm/s

PC connecté à Ethernet FSA - GDF Suez User : EXPERT

Cycle 3 programming

Rhapsodie.Net | [My_Project] - [My_Station] - [Cycles of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

Sheet List Advanced

Program # : 1 003 Created on : 03/06/2012 22:23:54 Modified on : 03/06/2012 22:44 Signed : EXPERT

Chaining # if Ok : 513 Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0.50 s

Cycle Type Press-Fitting Execution dir. Pressing

Forces ☐ Force Increment **Positions**

Max. Force : 550.0 daN Max. trip pos. : 5.700 mm

Trip Force : 500.0 daN **Trip position** : 4.000 mm

Min. Force : 450.0 daN Min. trip pos. : 4.300 mm

Quality checking on Peak Force

☒ Acceleration control Acc./decel. dist. 5.000 mm

☒ Store the Curve

☐ Auto return

☒ I/O validation needed for resume

☒ Cycle resume if NOK

Comments :

Press-fit Cycle with tripping by the force.
We applied 500daN and we try to reach the 4mm position which impossible to reach. Moreover, we check that the final position is into 5+/-0.3mm.
If this cycle is OK, the PLC allow the press to go back with the 513 soft chaining.
It should possible to the same, by using "Chaining #if OK : 0" and check the "Auto return" check.

As we want to check the press-fitting, we store also the curve in this cycle.
Then, we will programm a curve with 2 storing windows (1 for picking, 1 for press-fitting), and we will check the "1 ChkWd/Cycle".

Max. current 90.0 %

Working position 30.000 mm

Slowing down pos. 6.500 mm

Trip position 4.000 mm

Approach speed 70.00 % 326.7 mm/s

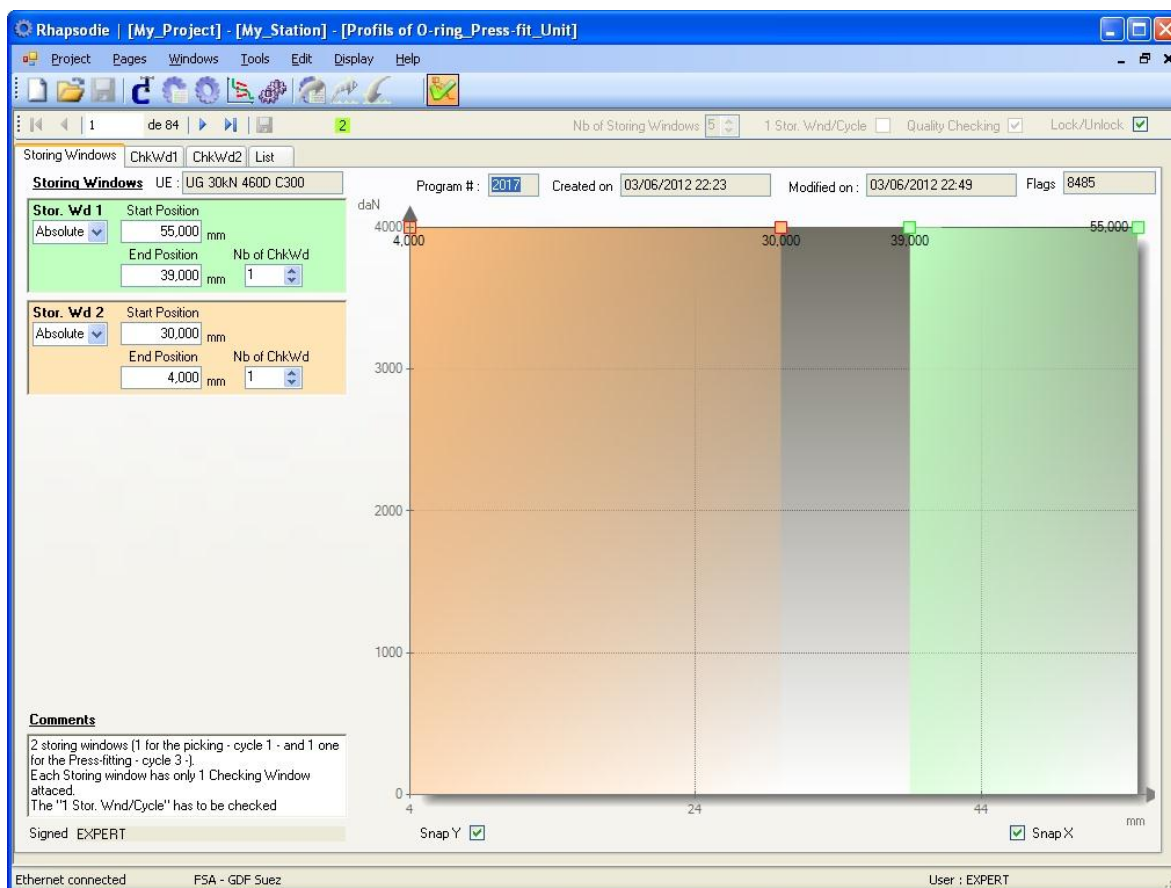
Return speed 70.00 % 326.7 mm/s

Working speed 5.00 % 23.3 mm/s

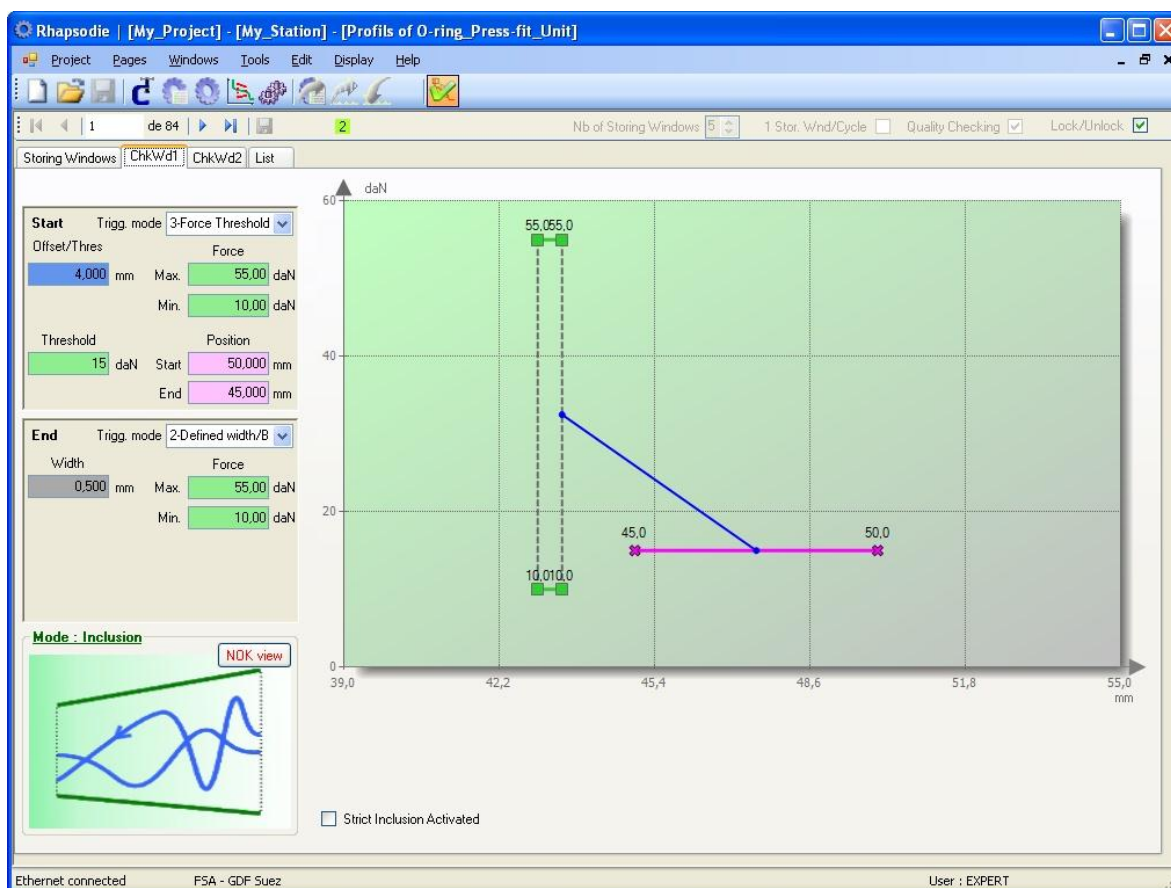
Trip speed 1.00 % 4.7 mm/s

PC connecté à Ethernet FSA - GDF Suez User : EXPERT

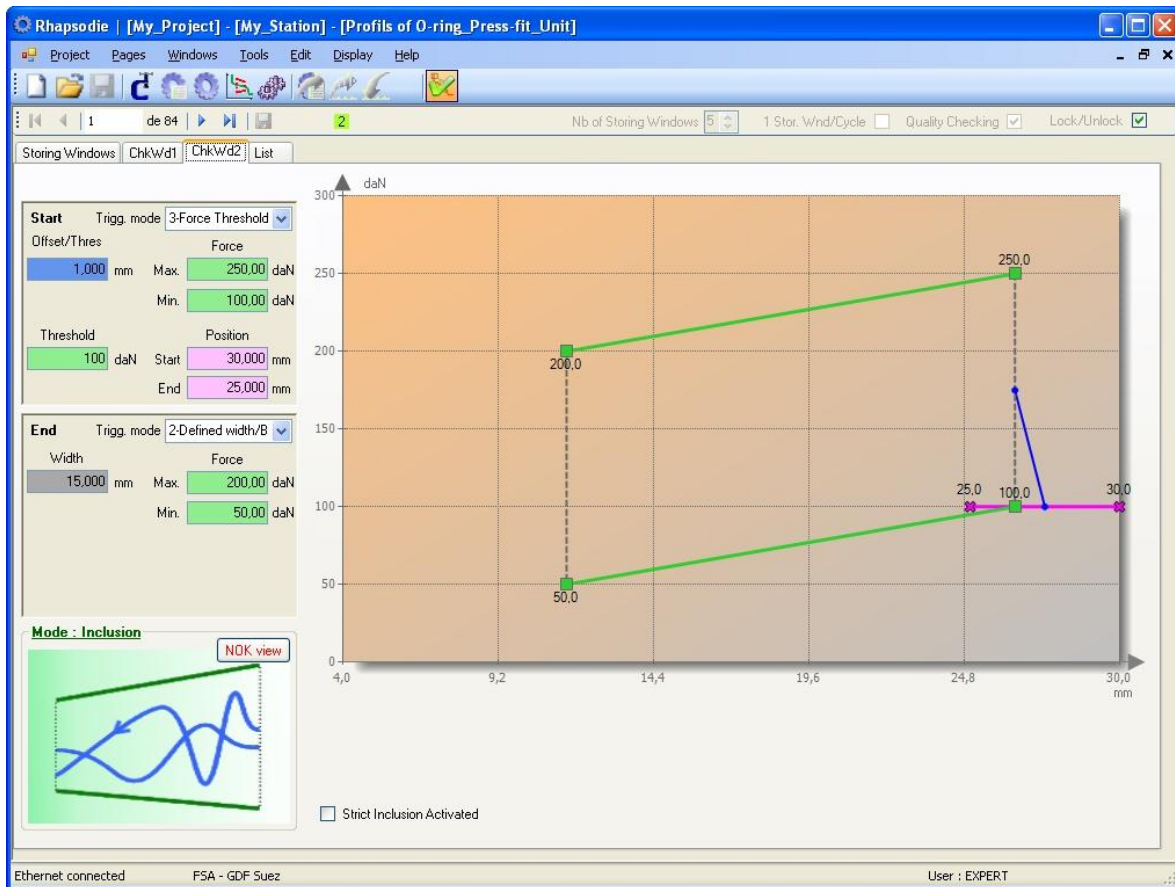
Programming of the storage program: Profile:



Check window no. 1



Check window no. 2



Programming of the sequence

Seq #	Cycle #	Curve #	Comments
1	1	17	Imported on 03/06/2012 22:23:54 by EXPERTFrom file Mon_Projet_Mon_Poste_UE-Emmarch-Joint_Export_12-06-03 22 22 53 Created on 03/06/201...
2	2	17	Imported on 03/06/2012 22:23:54 by EXPERTFrom file Mon_Projet_Mon_Poste_UE-Emmarch-Joint_Export_12-06-03 22 22 53 Created on 03/06/201...
3	30	0	Imported on 03/06/2012 22:23:54 by EXPERTFrom file Mon_Projet_Mon_Poste_UE-Emmarch-Joint_Export_12-06-03 22 22 53 Created on 03/06/201...
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	

Associated result block:

```

*****
Station/Channel/Addr :000.000.001.237.160.136.001
D/M/Y , H/M/S :26/04/2012 14:58/38,11
Total seq. time: 19.10 s
Pin. Temp: 24.96 Deg.
Module temp.: 45.96 Deg.
Sequence number: 1
Active Curves Check OK
Sequence OK
Result Number: 203843
Cyc. no. before Greasing: 99863
Curve number: 17
Cycle number: 3

```

START of RESULT BLOCK – Overall sequence block
This is the rack identification entered in Rhapsodie's Units page.

This is the program number (sequence) requested from the MVAT card by the PLC
There is a curve check program associated with this sequence. Its quality is active and OK.
The sequence is OK: all the executed cycles were OK and the curve check was also OK
Incremented for each part produced. Cannot be reinitialised
Count down to greasing configured on Specifications/Maintenance page
No. of curve program associated with the sequence
Number of cycles executed during the sequence

```
-----
Cycle number:          1
Form number:           1
Press-fitting pressing cycle OK
Cycle Time:            1.57 s
Previous position:     5.112 mm
Position reached:      42.217 mm OK
Peak force:            51.7 daN OK
Residual force:        50.5 daN
Position difference:    37.104 mm OK
-----
```

```
-----
Cycle number:          2
Form number:           2
Pulling cycle positioning OK
Cycle Time:            0.92 s
Previous position:     42.217 mm
Position reached:      52.257 mm OK
Peak force:            3.7 daN OK
Residual force:        0.9 daN
Position difference:    10.040 mm OK
-----
```

```
-----
Cycle number:          3
Form number:           3
Press-fitting pressing cycle NOT OK
Cycle Time:            2.85 s
Previous position:     52.257 mm
Position reached:      5.644 mm OK
Peak force:            504.2 daN OK
Residual force:        481.1 daN
Position difference:    -46.612 mm OK
Curve check OK
-----
```

```
*****
Curve Check: Curve Profile N0:          17
-----
```

```
-----
Start Increasing Threshold - End Fixed Width - Pressing Inclusion Mode
F 01; Fmax:      45.4 daN; Crv <= Max: OK; Fmin1:      25.3 daN; Crv >= Min: OK
-----
```

```
-----
Start Increasing Threshold - End Fixed Width - Pressing Inclusion Mode
F 02; Fmax:      200.8 daN; Crv <= Max: OK; Fmin1:      150.6 daN; Crv >= Min: OK
*****
```

```
Pitch number:        13
COM2 OK
Waiting for cycle start release
Presence Index
Idle position
Pitch number:         1
Awaiting Cycle Start
```

Start of 1st CYCLE BLOCK

First Cycle executed'

Cycle no. in Rhapsodie

Cycle type: Press-fitting, direction: Pressing, quality OK

Execution time of this cycle

Position reached in the previous cycle

Final position'

Final force (overshoot peak)

Final force at the end of the holding time

Difference between the final position and the previous position, or the initial position (see Rhapsodie/Cycles)

Start of 2nd CYCLE BLOCK

Second Cycle

C'

Cycle type: Positioning (relative movement), Direction: Pulling, Quality OK

Start of 3rd CYCLE BLOCK

As the curve check has been completed in this cycle, the result is displayed

"WINDOW" RESULT BLOCK

No. of curve control program. Type: PROFILE (no. > 16)

1st Window

Start Increasing Threshold - End Fixed Width - Pressing Inclusion Mode

F 01; Fmax: 45.4 daN; Crv <= Max: OK; Fmin1: 25.3 daN; Crv >= Min: OK

2nd Window

Start Increasing Threshold - End Fixed Width - Pressing Inclusion Mode

F 02; Fmax: 200.8 daN; Crv <= Max: OK; Fmin1: 150.6 daN; Crv >= Min: OK

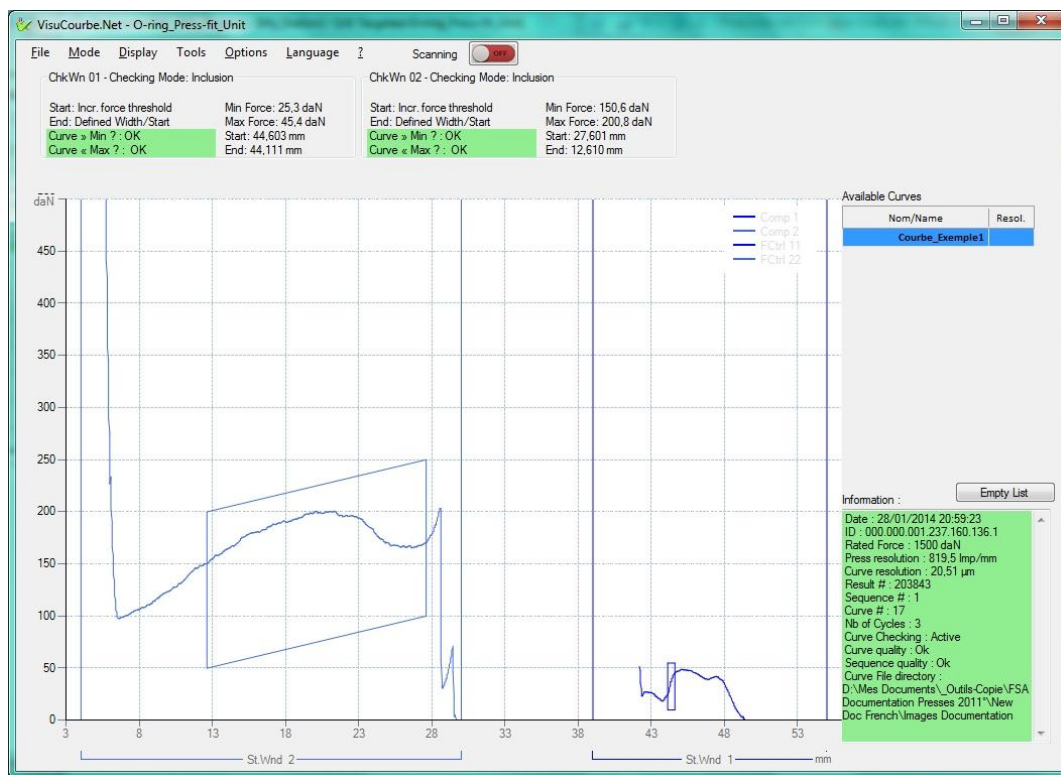
The curve was sent to the PC. Transmission OK

The pin shaft has returned to the origin position. The index (inductive sensor is present)

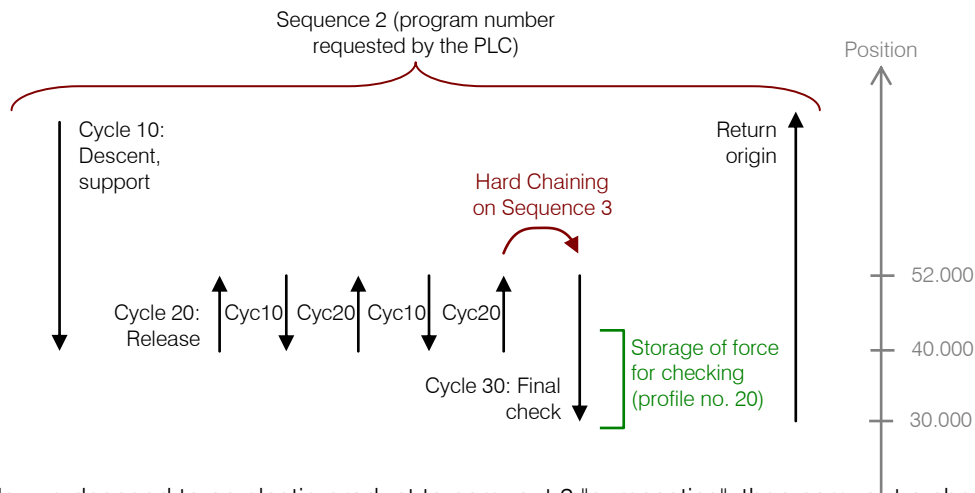
The shaft has reached its origin, idle position, PULSE'

The card is ready again, awaiting Cycle Start.

Curve obtained:



5.5.4 Sequence with a "Looping" phase then a "Check" phase



In this example, we descend to an elastic product to carry out 3 "gymnastics", then carry out a check cycle, then return to the origin automatically

Cycle 10 programming

The screenshot shows the Rhapsodie.Net software interface for programming Cycle 10. The main window displays various parameters for the cycle, including Program # (1 010), Created on (03/06/2012 22:23:54), Modified on (03/06/2012 22:23), and Signed (EXPERT). The Cycle Type is set to Press-Fitting, and the Execution dir. is Pressing. The Force Increment is checked, and the Max. Force is 120,0 daN. The Trip Force is 100,0 daN, and the Min. Force is 50,0 daN. The Quality checking on is set to Peak Force. The Acceleration control is checked, and the Acc./decel. dist. is 5,000 mm. The Store the Curve, Auto return, and I/O validation needed for resume options are unchecked. The Cycle resume if Nok option is checked. The Comments section shows the cycle was imported on 03/06/2012 22:23:54 by EXPERT, from file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53, and created on 03/06/2012 22:22:53. The right side of the interface shows a graph of the cycle profile with various speed and position parameters: Max. current (90,0 %), Approach speed (70,00 %, 326,7 mm/s), Return speed (70,00 %, 326,7 mm/s), Working speed (15,00 %, 70,0 mm/s), Working position (50,000 mm), Slowing down pos. (42,000 mm), Trip position (40,000 mm), Trip speed (5,00 %, 23,3 mm/s).

Cycle 20 programming

Rhapsodie.Net | [My_Project] - [My_Station] - [Cycles of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

Sheet List Advanced

Program # : 1 020 Created on : 03/06/2012 22:23:54 Modified on : 03/06/2012 22:23 Signed : EXPERT

Chaining # if Ok : 10 Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0,50 s

Cycle Type Positioning Execution dir. Pulling

Forces ☐ Force Increment

Max. Force : 120,0 daN

Trip Force : 100,0 daN

Min. Force : 50,0 daN

Quality checking on Peak Force

Positions

Max. trip pos. : 0,000 mm

Trip Distance : -12,000 mm

Min. trip pos. : 0,000 mm

☒ Acceleration control Acc./decel. dist. 5,000 mm

☐ Store the Curve

☐ Auto return

☐ I/O validation needed for resume

☒ Cycle resume if NOK

Comments :

Imported on 03/06/2012 22:23:54 by EXPERT
From file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53
Created on 03/06/2012 22:22:53

Max. current 90,0 %

Trip Dist. -12,000 mm

Slowing down Dist. -8,000 mm

Working Dist. 46,7 mm/s

Trip speed 2,00 % 9,3 mm/s

Return speed 70,00 % 326,7 mm/s

Working speed 10,00 % 46,7 mm/s

Approach speed 30,00 % 140,0 mm/s

PC connecté à Ethernet FSA - GDF Suez User : EXPERT

Cycle 30 programming

Rhapsodie.Net | [My_Project] - [My_Station] - [Cycles of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

Sheet List Advanced

Program # : 1 030 Created on : 03/06/2012 22:23:54 Modified on : 03/06/2012 22:23 Signed : EXPERT

Chaining # if Ok : 0 Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0,50 s

Cycle Type Press-Fitting Execution dir. Pressing

Forces ☐ Force Increment

Max. Force : 220,0 daN

Trip Force : 200,0 daN

Min. Force : 180,0 daN

Quality checking on Peak Force

Positions

Max. trip pos. : 30,500 mm

Trip position : 30,000 mm

Min. trip pos. : 29,500 mm

☒ Acceleration control Acc./decel. dist. 5,000 mm

☒ Store the Curve

☒ Auto return

☐ I/O validation needed for resume

☒ Cycle resume if NOK

Comments :

Imported on 03/06/2012 22:23:54 by EXPERT
From file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53
Created on 03/06/2012 22:22:53

Max. current 90,0 %

Working position 50,000 mm

Slowing down pos. 32,000 mm

Trip position 30,000 mm

Approach speed 30,00 % 140,0 mm/s

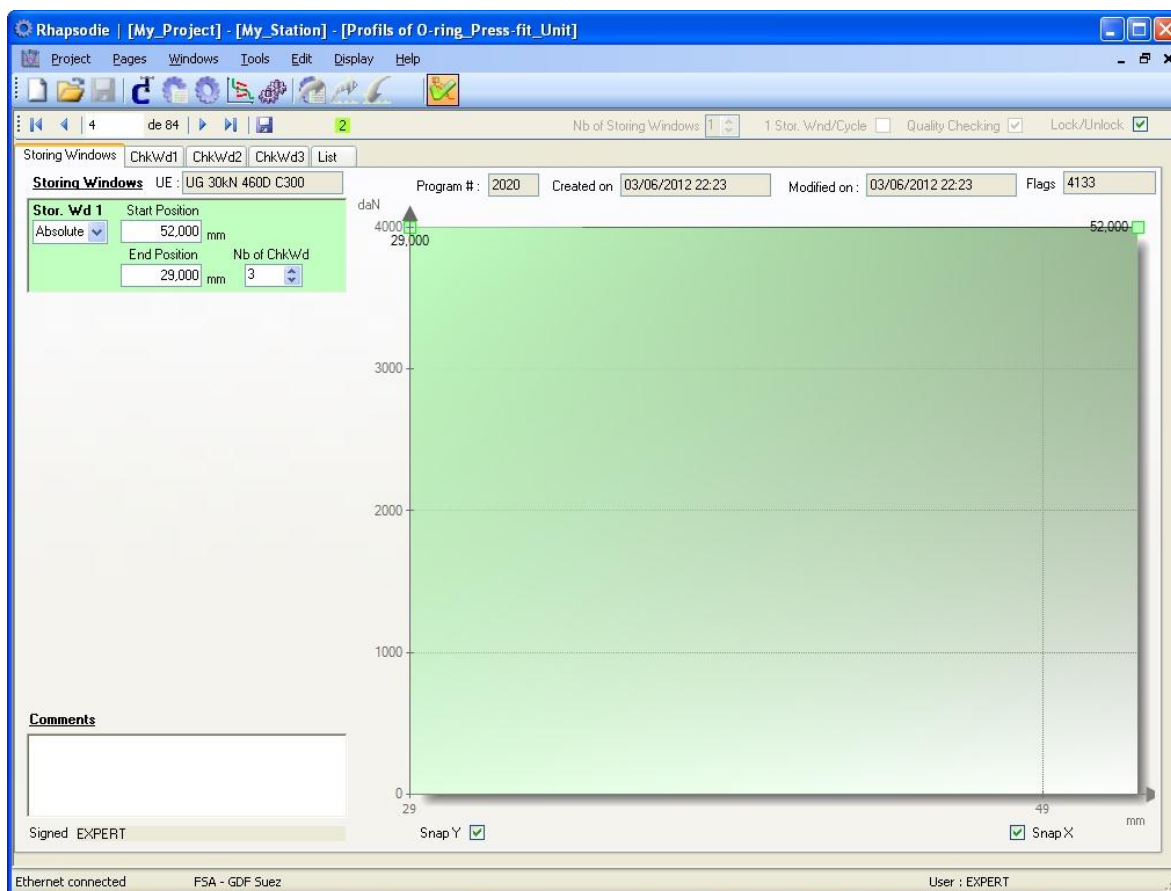
Return speed 70,00 % 326,7 mm/s

Working speed 5,00 % 23,3 mm/s

Trip speed 1,00 % 4,7 mm/s

PC connecté à Ethernet FSA - GDF Suez User : EXPERT

Force storage programming: Profile no. 20



Programming of sequences 2 and 3

The screenshot shows the 'Rhapsodie' software interface for 'My_Project' - 'My_Station' - '[Sequences of O-ring_Press-fit_Unit]'. The 'Sequences' tab is active, displaying a table with sequence data. The table has columns for 'Seq #', 'Cycle #', 'Curve #', and 'Comments'. The data is as follows:

Seq #	Cycle #	Curve #	Comments
1	1	17	
2	10	20	As the PLC call in first the Sequence #2, the curve storing program is attached on this sequence, even the effective storing is made during the cycle 30
3	30	0	which is called in a hard chaining with the sequence #3.
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	

The status bar at the bottom indicates 'Ethernet connected', 'FSA - GDF Suez', and 'User : EXPERT'.

The screenshot shows the 'Rhapsodie' software interface for 'My_Project' - 'My_Station' - '[Sequences of O-ring_Press-fit_Unit]'. The 'Sequences' tab is active, displaying a table with sequence data. The table has columns for 'Seq #', 'Cycle #', 'Curve #', and 'Comments'. The data is as follows:

Seq #	Cycle #	Curve #	Comments
1	1	17	
2	10	20	As the PLC call in first the Sequence #2, the curve storing program is attached on this sequence, even the effective storing is made during the cycle 30
3	30	0	Soft chaining programmed // 10 // 20 // ...10 Loop! which is called in a hard chaining with the sequence #3.
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	

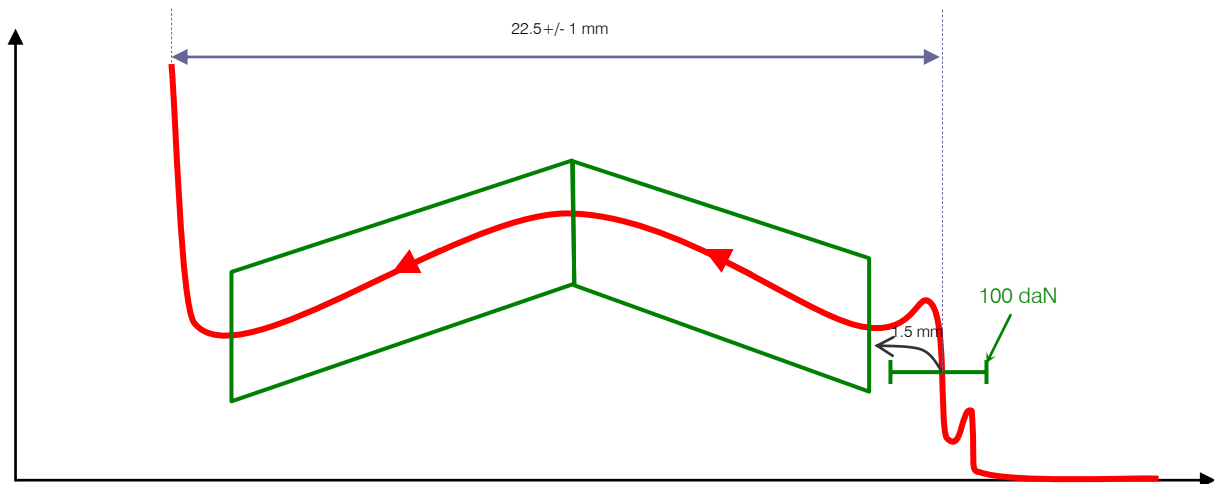
The status bar at the bottom indicates 'Ethernet connected', 'FSA - GDF Suez', and 'User : EXPERT'.

5.5.5 Sequence with single press-fitting with a narrowly-targeted curve check

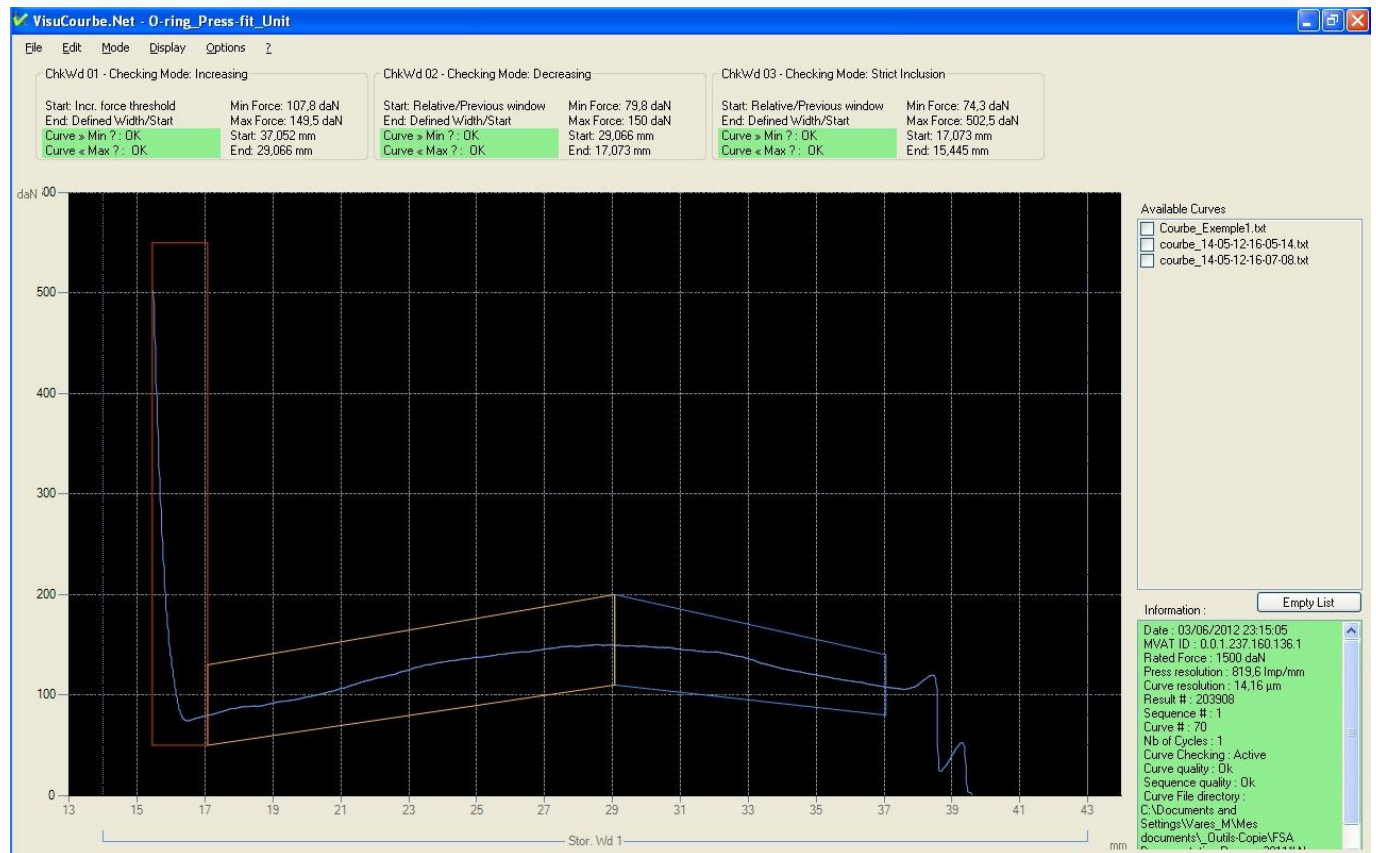
This example illustrates how to program a complete part check (threshold in cycle, profile during press-fitting, test of length press-fitted, etc.)

The checks requested are as follows:

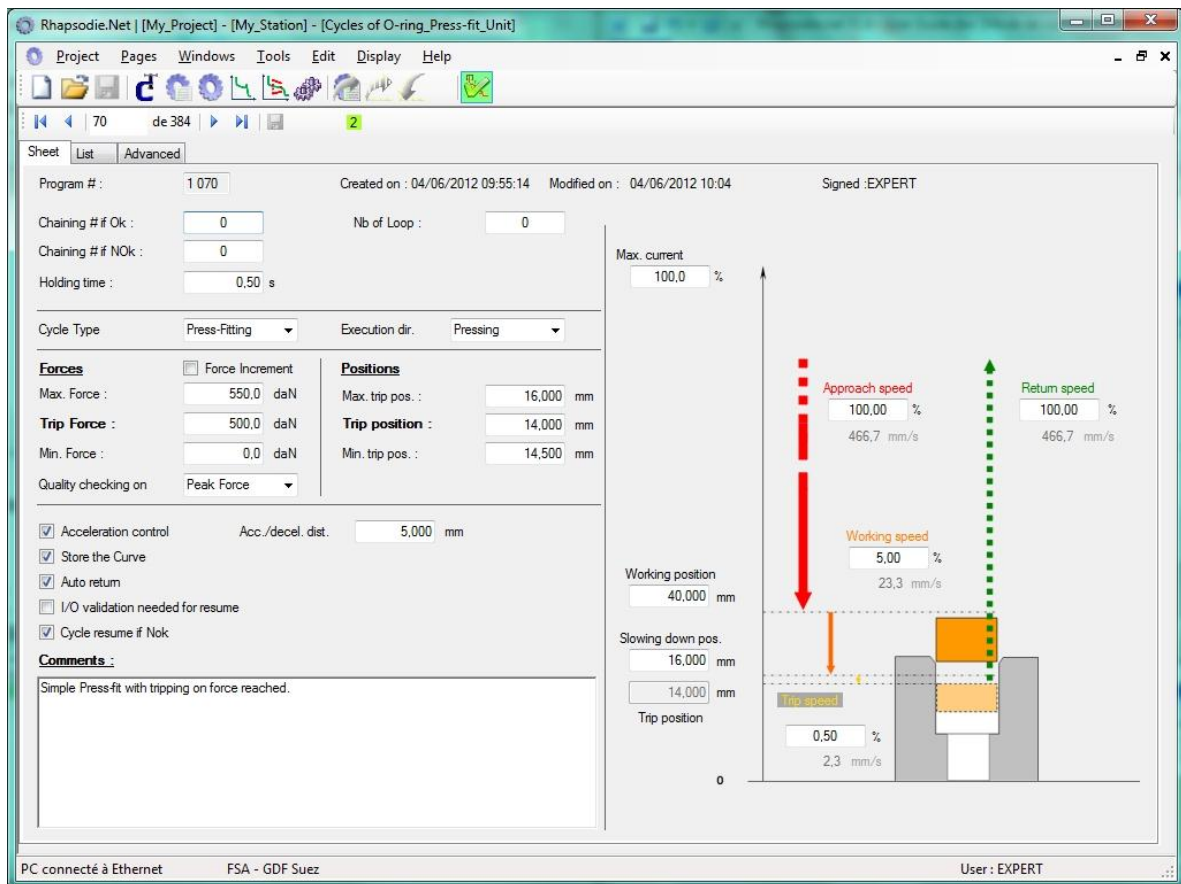
- On a force threshold of 100 daN, start a profile with checking of an increasing phase and a decreasing phase.
- Check the length of the part (22.5 mm +/- 1 mm) relative to the threshold of 100 daN



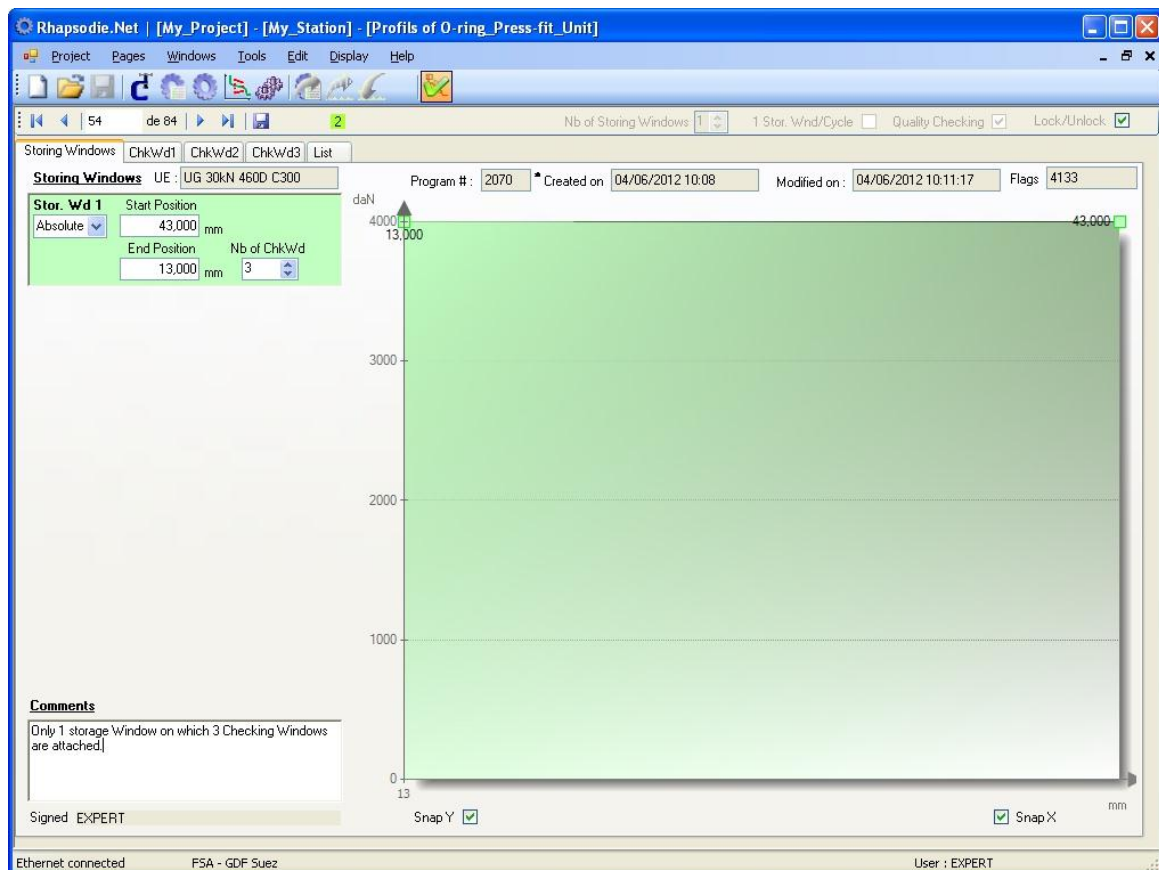
Resulting curve



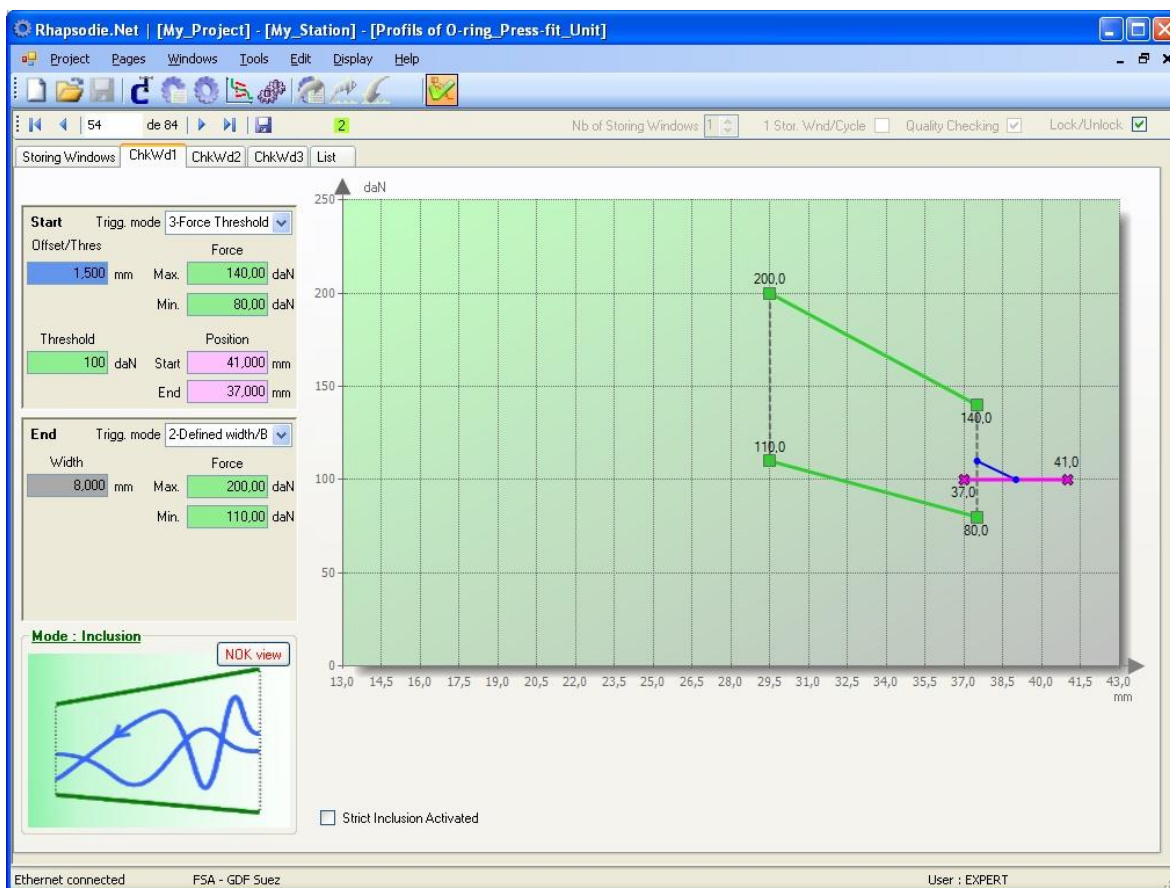
Cycle programming



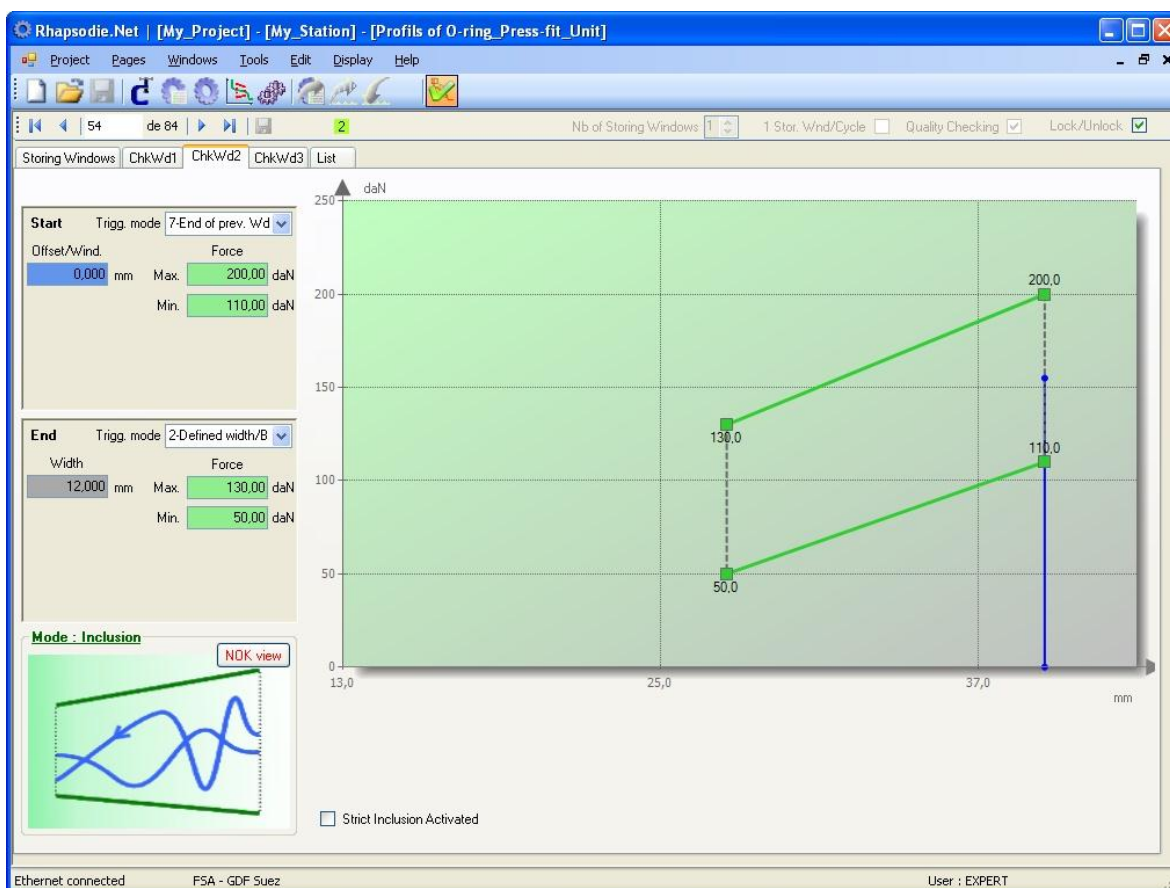
Profile programming: Recording range



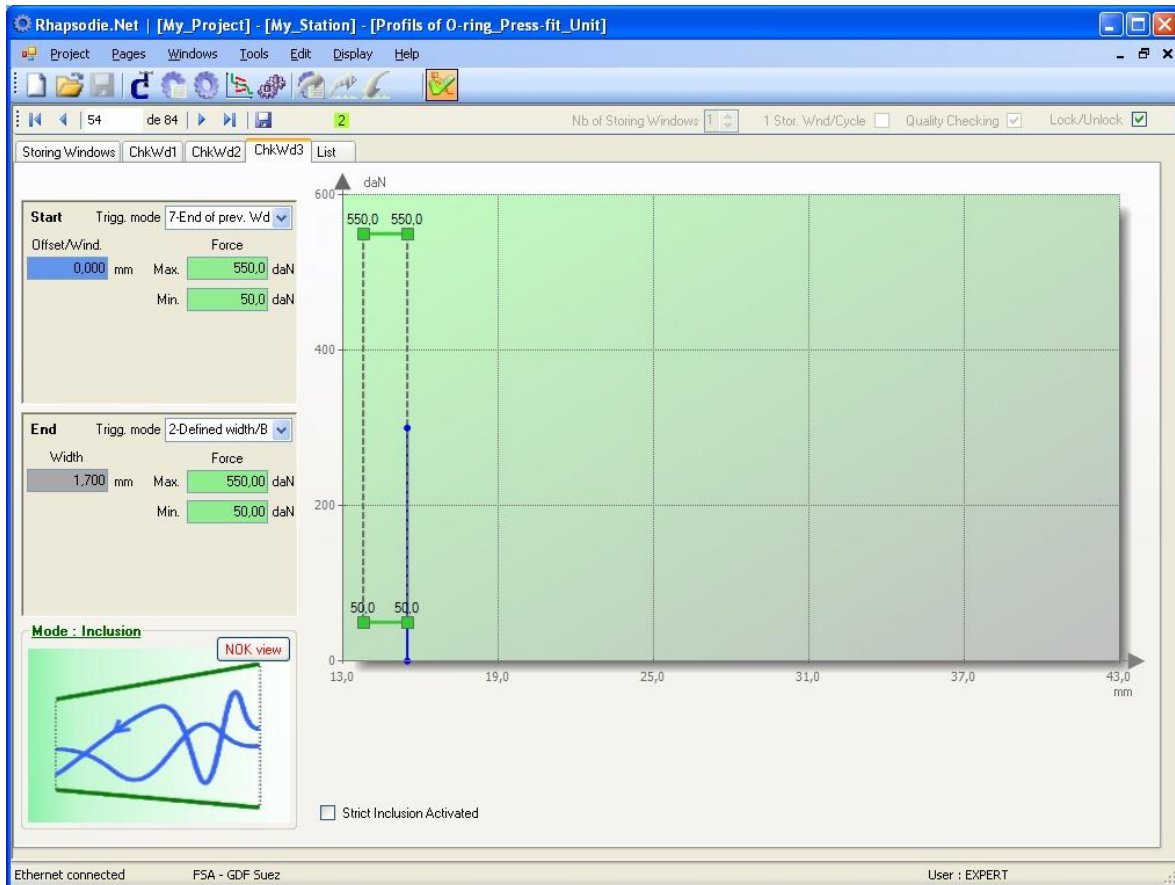
Check windows: ChkWd1



Check windows: ChkWd2



Check windows: ChkWd3

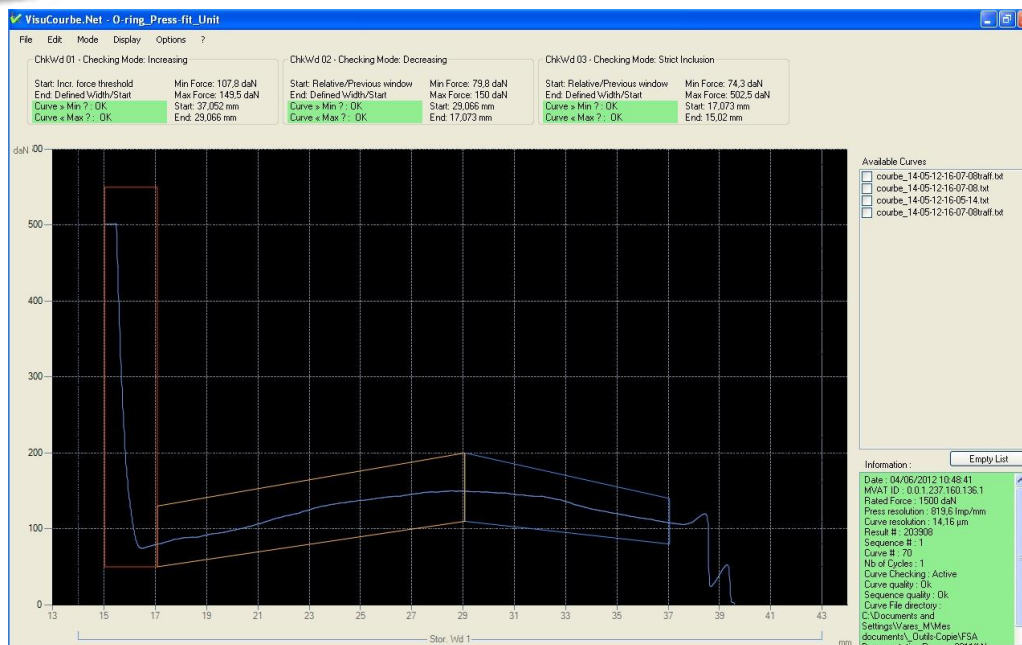


It can be seen that the 2 roles of windows 1 and 2 are as follows:

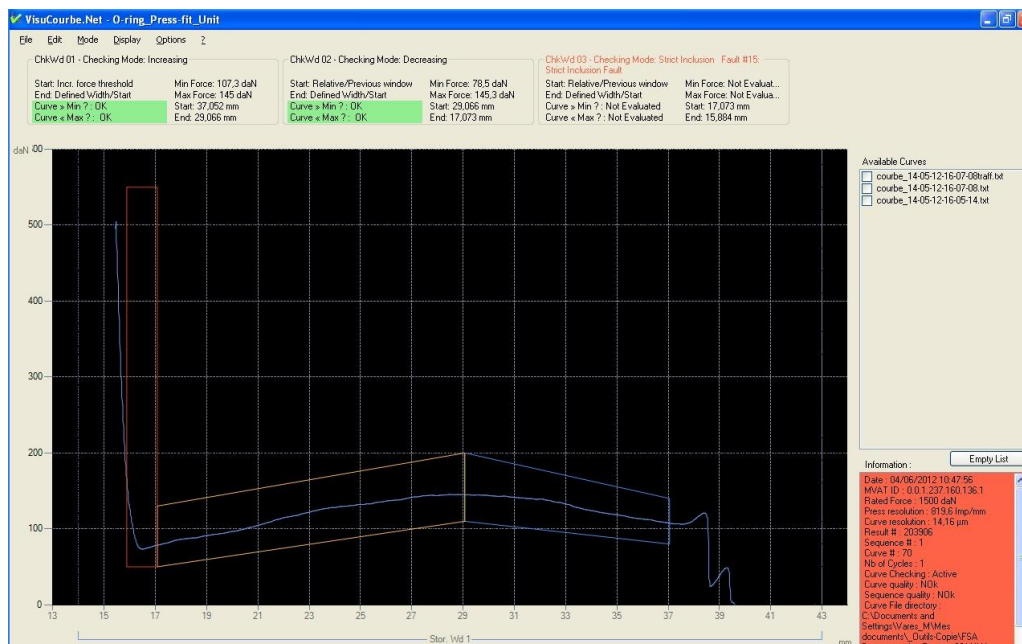
- check the increase and decrease
 - check that the length of the part is a minimum of 21.5 mm ($\text{Start Offset} + \text{width ChkWd1} + \text{width ChkWd2} = 21.5$)
- Window 3, configured in strict inclusion mode, ensures that the part does not exceed 22.5 mm ($\text{Start Offset} + \text{width ChkWd1} + \text{width ChkWd2} + \text{width ChkWd3} = 22.5$)

WARNING: on the curve for the correct part, we note that the representation of the 3rd check window does not relate to the configuration: it should be 2 mm wide, while it is in fact only 1.628mm ($17.073 - 15.445$).

This is because the last check curve is always represented with its end brought back to the last point on the curve. We will therefore never see:



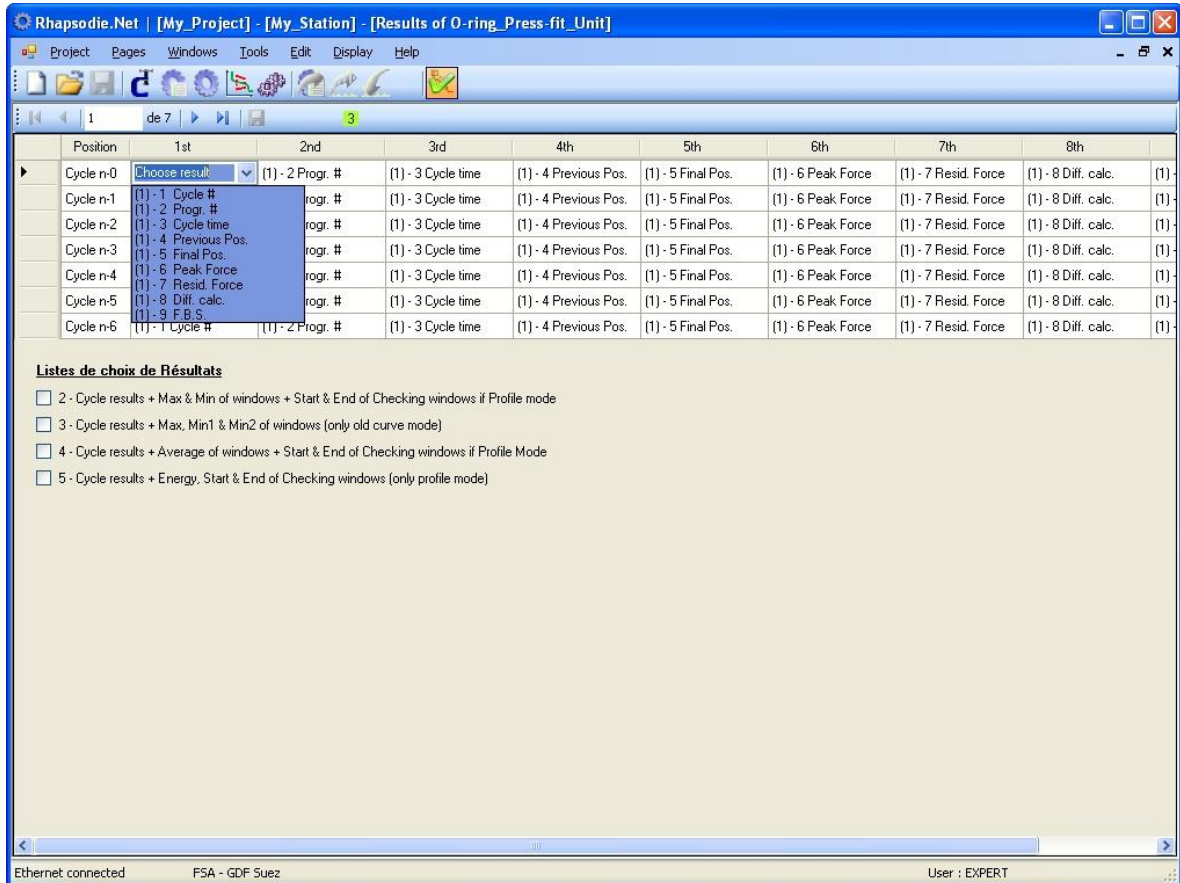
If the part is too long, the curve exits from check window no. 3, and a strict inclusion fault is obtained on the last window:



5.5.6 Page: "Results": (field bus only)

This menu allows the user to configure the construction of the table of press-fitting results obtained from the MVAT in the network coupler. These results may be retrieved by the PLC.

Single List (by default):



Various selection lists of the values received are available:
For more information on retrieving results, see the "Results" section

List no. 2

Position	1st	2nd	3rd
Cycle n-0	Choose result	(1) - 2 Progr. #	(1) - 3 Cycle time
Cycle n-1	(2) - 1 Cycle #	rogr. #	(1) - 3 Cycle time
Cycle n-2	(2) - 2 Progr. #	rogr. #	(1) - 3 Cycle time
Cycle n-3	(2) - 3 Cycle time	rogr. #	(1) - 3 Cycle time
Cycle n-4	(2) - 4 Previous Pos.	rogr. #	(1) - 3 Cycle time
Cycle n-5	(2) - 5 Final Pos.	rogr. #	(1) - 3 Cycle time
Cycle n-6	(2) - 6 Peak Force	rogr. #	(1) - 3 Cycle time
	(2) - 7 Resid. Force	rogr. #	(1) - 3 Cycle time
	(2) - 8 Diff. calc.	rogr. #	(1) - 3 Cycle time
	(2) - 9 F.B.S.	rogr. #	(1) - 3 Cycle time
	(2) - 10 Fmax Win1		
	(2) - 11 Fmin Win1		
	(2) - 12 Fmax Win2		
	(2) - 13 Fmin Win2		
	(2) - 14 Fmax Win3		
	(2) - 15 Fmin Win3		
	(2) - 16 Fmax Win4		
	(2) - 17 Fmin Win4		
	(2) - 18 Fmax Win5		
	(2) - 19 Fmin Win5		
	(2) - 20 Fmax Win6		
	(2) - 21 Fmin Win6		
	(2) - 22 Fmax Win7		
	(2) - 23 Fmin Win7		
	(2) - 24 Fmax Win8		
	(2) - 25 Fmin Win8		
	(2) - 26 Fmax Win9		
	(2) - 27 Fmin Win9		
	(2) - 28 Fmax Win10		
	(2) - 29 Fmin Win10		
	(2) - 30 ...		
	(2) - 31 ...		
	(2) - 32 ...		
	(2) - 33 ...		
	(2) - 34 ...		
	(2) - 35 ...		
	(2) - 36 ...		
	(2) - 37 ...		
	(2) - 38 ...		
	(2) - 39 ...		
	(2) - 40 Start Chkwd1		
	(2) - 41 End Chkwd1		
	(2) - 42 Start Chkwd2		
	(2) - 43 End Chkwd2		
	(2) - 44 Start Chkwd3		
	(2) - 45 End Chkwd3		
	(2) - 46 Start Chkwd4		
	(2) - 47 End Chkwd4		
	(2) - 48 Start Chkwd5		
	(2) - 49 End Chkwd5		

Listes de choix

☒ 2 - Cycle resu

☐ 3 - Cycle resu

☐ 4 - Cycle resu

☐ 5 - Cycle resu

art & End of Checking windows

ws (only old curve mode)

t & End of Checking windows if

cking windows (only profile mode)

ethernet connected

List no. 3

Position	1st	2nd
Cycle n-0	Choose result	(1) - 2 Progr. #
Cycle n-1	(3) - 1 Cycle #	rogr. #
Cycle n-1	(3) - 2 Progr. #	(1) -
Cycle n-2	(3) - 3 Cycle time	rogr. #
Cycle n-2	(3) - 4 Previous Pos.	(1) -
Cycle n-3	(3) - 5 Final Pos.	rogr. #
Cycle n-4	(3) - 6 Peak Force	rogr. #
Cycle n-4	(3) - 7 Resid. Force	(1) -
Cycle n-5	(3) - 8 Diff. calc.	rogr. #
Cycle n-5	(3) - 9 F.B.S.	(1) -
Cycle n-6	(3) - 10 Fmax Win1	rogr. #
Cycle n-6	(3) - 11 Fmin1 Win1	(1) -
Cycle n-6	(3) - 12 Fmin2 Win1	
Cycle n-6	(3) - 13 Fmax Win2	
Cycle n-6	(3) - 14 Fmin1 Win2	
Cycle n-6	(3) - 15 Fmin2 Win2	
Cycle n-6	(3) - 16 Fmax Win3	
Cycle n-6	(3) - 17 Fmin1 Win3	
Cycle n-6	(3) - 18 Fmin2 Win3	
Cycle n-6	(3) - 19 Fmax Win4	
Cycle n-6	(3) - 20 Fmin1 Win4	
Cycle n-6	(3) - 21 Fmin2 Win4	
Cycle n-6	(3) - 22 Fmax Win5	
Cycle n-6	(3) - 23 Fmin1 Win5	
Cycle n-6	(3) - 24 Fmin2 Win5	
Cycle n-6	(3) - 25 Fmax Win6	
Cycle n-6	(3) - 26 Fmin1 Win6	
Cycle n-6	(3) - 27 Fmin2 Win6	
Cycle n-6	(3) - 28 Fmax Win7	
Cycle n-6	(3) - 29 Fmin1 Win7	
Cycle n-6	(3) - 30 Fmin2 Win7	
Cycle n-6	(3) - 31 Fmax Win8	
Cycle n-6	(3) - 32 Fmin1 Win8	
Cycle n-6	(3) - 33 Fmin2 Win8	
Cycle n-6	(3) - 34 Fmax Win9	
Cycle n-6	(3) - 35 Fmin1 Win9	
Cycle n-6	(3) - 36 Fmin2 Win9	
Cycle n-6	(3) - 37 Fmax Win10	
Cycle n-6	(3) - 38 Fmin1 Win10	
Cycle n-6	(3) - 39 Fmin2 Win10	

List no. 4

	Position	1st	2nd	3rd
►	Cycle n-0	Choose result ▼	(1) - 2 Progr. #	(1) - 3 Cycle
	Cycle n-1	(4) - 1 Cycle #	rogr. #	(1) - 3 Cycle
	Cycle n-2	(4) - 2 Progr. #	rogr. #	(1) - 3 Cycle
	Cycle n-3	(4) - 3 Cycle time	rogr. #	(1) - 3 Cycle
	Cycle n-4	(4) - 4 Previous Pos.	rogr. #	(1) - 3 Cycle
	Cycle n-5	(4) - 5 Final Pos.	rogr. #	(1) - 3 Cycle
	Cycle n-6	(4) - 6 Peak Force	rogr. #	(1) - 3 Cycle
		(4) - 7 Resid. Force	rogr. #	(1) - 3 Cycle
		(4) - 8 Diff. calc.	rogr. #	(1) - 3 Cycle
		(4) - 9 F.B.S.	rogr. #	(1) - 3 Cycle
		(4) - 10 Faver. Win1		
		(4) - 11 Faver. Win2		
		(4) - 12 Faver. Win3		
		(4) - 13 Faver. Win4		
		(4) - 14 Faver. Win5		
		(4) - 15 Faver. Win6		
		(4) - 16 Faver. Win7		
		(4) - 17 Faver. Win8		
		(4) - 18 Faver. Win9		
		(4) - 19 Faver. Win10		
		(4) - 20 ...		
		(4) - 21 ...		
		(4) - 22 ...		
		(4) - 23 ...		
		(4) - 24 ...		
		(4) - 25 ...		
		(4) - 26 ...		
		(4) - 27 ...		
		(4) - 28 ...		
		(4) - 29 ...		
		(4) - 30 ...		
		(4) - 31 ...		
		(4) - 32 ...		
		(4) - 33 ...		
		(4) - 34 ...		
		(4) - 35 ...		
		(4) - 36 ...		
		(4) - 37 ...		
		(4) - 38 ...		
		(4) - 39 ...		
		(4) - 40 Start ChkWd1		
		(4) - 41 End ChkWd1		
		(4) - 42 Start ChkWd2		
		(4) - 43 End ChkWd2		
		(4) - 44 Start ChkWd3		
		(4) - 45 End ChkWd3		
		(4) - 46 Start ChkWd4		
		(4) - 47 End ChkWd4		
		(4) - 48 Start ChkWd5		
		(4) - 49 End ChkWd5		

List no. 5

[illegible]

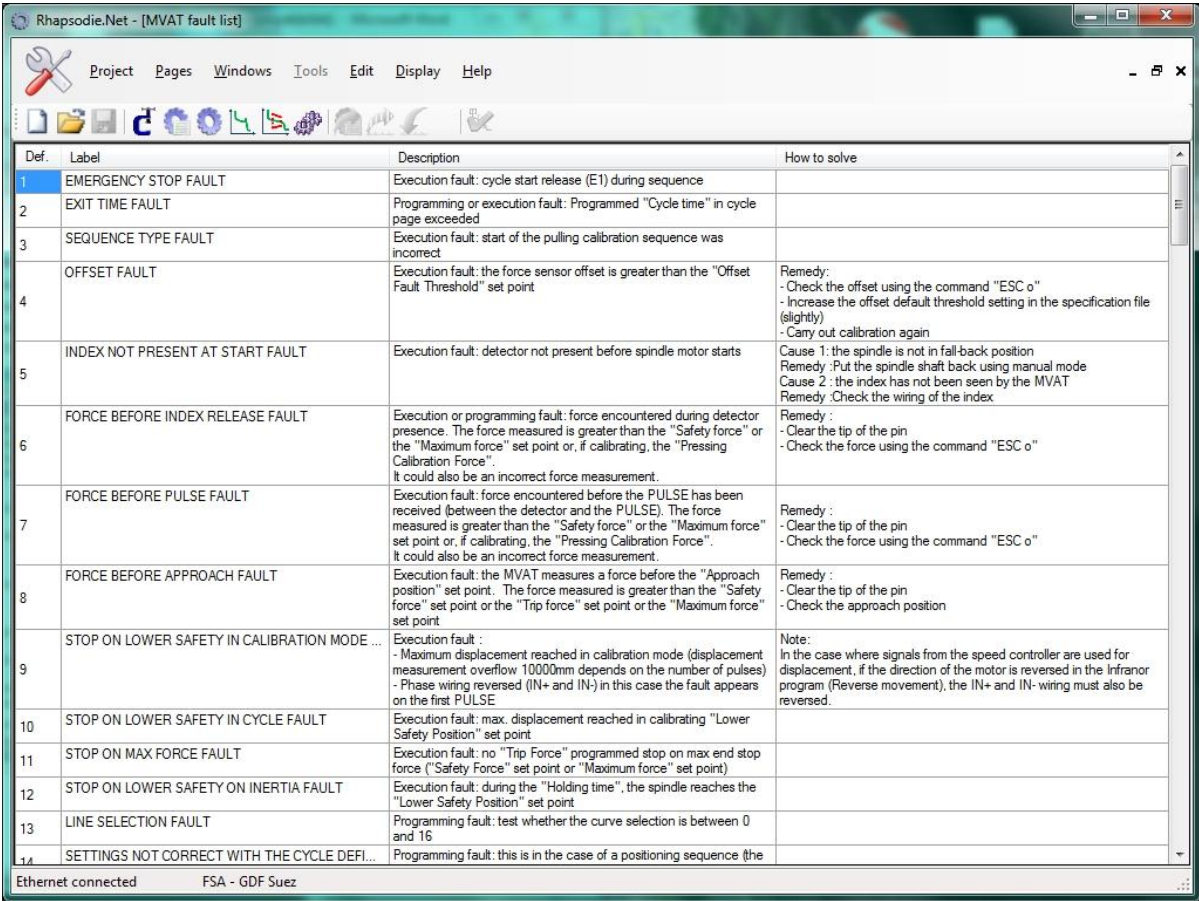
5.5.7 Help Menu

5.5.7.1 Rhapsodie Guide

This gives direct access to the User Guide in PDF format.

5.5.7.2 MVAT fault List

Since the V1.6.0.00 Rhapsodie.Net version, a MVAT fault list is available directly in Rhapsodie thanks to this menu.



Def.	Label	Description	How to solve
1	EMERGENCY STOP FAULT	Execution fault: cycle start release (E1) during sequence	
2	EXIT TIME FAULT	Programming or execution fault: Programmed "Cycle time" in cycle page exceeded	
3	SEQUENCE TYPE FAULT	Execution fault: start of the pulling calibration sequence was incorrect	
4	OFFSET FAULT	Execution fault: the force sensor offset is greater than the "Offset Fault Threshold" set point	Remedy : - Check the offset using the command "ESC o" - Increase the offset default threshold setting in the specification file (slightly) - Carry out calibration again
5	INDEX NOT PRESENT AT START FAULT	Execution fault: detector not present before spindle motor starts	Cause 1: the spindle is not in fall-back position Remedy : Put the spindle shaft back using manual mode Cause 2 : the index has not been seen by the MVAT Remedy : Check the wiring of the index
6	FORCE BEFORE INDEX RELEASE FAULT	Execution or programming fault: force encountered during detector presence. The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement.	Remedy : - Clear the tip of the pin - Check the force using the command "ESC o"
7	FORCE BEFORE PULSE FAULT	Execution fault: force encountered before the PULSE has been received (between the detector and the PULSE). The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement.	Remedy : - Clear the tip of the pin - Check the force using the command "ESC o"
8	FORCE BEFORE APPROACH FAULT	Execution fault: the MVAT measures a force before the "Approach position" set point. The force measured is greater than the "Safety force" set point or the "Trip force" set point or the "Maximum force" set point	Remedy : - Clear the tip of the pin - Check the approach position
9	STOP ON LOWER SAFETY IN CALIBRATION MODE ...	Execution fault : - Maximum displacement reached in calibration mode (displacement measurement overflow 10000mm depends on the number of pulses) - Phase wiring reversed (IN+ and IN-) in this case the fault appears on the first PULSE	Note: In the case where signals from the speed controller are used for displacement, if the direction of the motor is reversed in the Infranor program (Reverse movement), the IN+ and IN- wiring must also be reversed.
10	STOP ON LOWER SAFETY IN CYCLE FAULT	Execution fault: max. displacement reached in calibrating "Lower Safety Position" set point	
11	STOP ON MAX FORCE FAULT	Execution fault: no "Trip Force" programmed stop on max end stop force ("Safety Force" set point or "Maximum force" set point)	
12	STOP ON LOWER SAFETY ON INERTIA FAULT	Execution fault: during the "Holding time", the spindle reaches the "Lower Safety Position" set point	
13	LINE SELECTION FAULT	Programming fault: test whether the curve selection is between 0 and 16	
14	SETTINGS NOT CORRECT WITH THE CYCLE DEF...	Programming fault: this is in the case of a positioning sequence (the	

Ethernet connected FSA - GDF Suez

5.5.7.3 "UE references page"

This page displays all the press-fitting pins in the Fabricom range.

It is essential to select the correct pin for each new UE created in the Press-fitting Units page, as a number of settings are pre-entered depending on the unit selected. The values used to pre-enter these fields come from this table.

UE Reference	Capacity kN	Nominal kN	Sensiv. mV/V	Pitch mm	Diameter mm	INb/Pitc	Idx Center	Stroke mm	Reduct.	Speed rpm	Nom. Intensity	Max. Intensity	Comments
UG 02kN 660D C300	2,00	2,00	0,8000	10,000	12,000	4 096	5,000	300,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 02kN 660D C500	2,00	2,00	0,8000	10,000	12,000	4 096	5,000	500,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 05kN 330D C300	5,00	7,50	1,0000	5,000	12,000	4 096	2,500	300,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 05kN 330D C500	5,00	7,50	1,0000	5,000	12,000	4 096	2,500	500,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 15kN 525D C300	15,00	20,00	1,1300	7,000	21,000	4 096	3,500	300,000	1,0000	4 500,00	20,0	45,0	FSA - UG15
UG 15kN 525D C500	15,00	20,00	1,1300	7,000	21,000	4 096	3,500	500,000	1,0000	4 500,00	20,0	45,0	FSA - UG15
UG 30kN 460D C300	30,00	40,00	1,1300	8,000	27,000	4 096	4,000	300,000	1,0000	3 500,00	20,0	45,0	FSA - UG30
UG 30kN 460D C500	30,00	40,00	1,3000	8,000	27,000	4 096	4,000	500,000	1,0000	3 500,00	20,0	45,0	FSA - UG30
UG 60kN 700D C300	60,00	100,00	2,0000	15,000	30,000	4 096	7,500	300,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 60kN 700D C500	60,00	100,00	2,0000	15,000	30,000	4 096	7,500	500,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 80kN 470D C300	80,00	100,00	2,0000	10,000	39,000	4 096	5,000	300,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 80kN 470D C500	80,00	100,00	2,0000	10,000	39,000	4 096	5,000	500,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 100kN 370D C300	100,00	100,00	2,0000	8,000	45,000	4 096	4,000	300,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 100kN 370D C500	100,00	100,00	2,0000	8,000	45,000	4 096	4,000	500,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 100kN 370D C800	100,00	100,00	2,0000	8,000	45,000	4 096	4,000	800,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
MMT 200kN 900D C300	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	300,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 200kN 900D C600	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	600,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 200kN 900D C900	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	900,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 200kN 900D C12...	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	1 200,0...	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C300	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	300,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C600	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	600,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C900	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	900,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C13...	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	1 200,0...	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 400kN 560D C300	400,00	400,00	1,5000	25,000	100,000	4 096	12,500	300,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 400kN 560D C600	400,00	400,00	1,5000	25,000	100,000	4 096	12,500	600,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 400kN 560D C900	400,00	400,00	1,5000	25,000	100,000	4 096	12,500	900,000	1,0000	1 500,00	220,0	350,0	FSA - MMT

When you pass the mouse over the small columns on the right you see:

creation date	modification date	person who changed the reference.	Status (locked?)

Creating a new UE:

The list of UEs is not fixed and it is possible to add UEs with characteristics which are specific to them. To do this, you can:



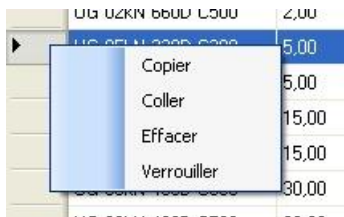
Add a UE



Delete a UE

Locking a UE:

After creating a new UE, it is possible to lock it to avoid the risk of deletion. To do this, select the UE then right-click it



Then use the "Lock" command

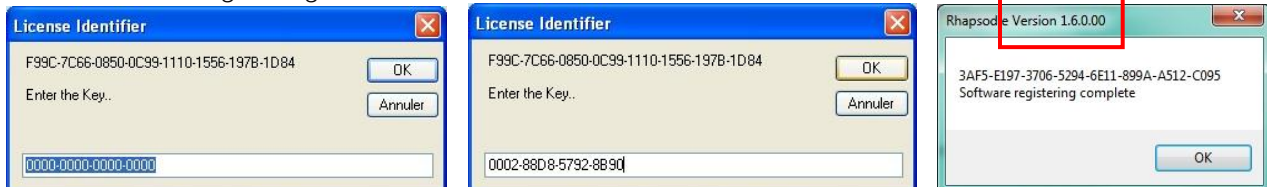
WARNING: once locked, it will not be possible to delete this UE.

You will only be able to reinitialise the database by retrieving the original file from the Rhapsodie.net installation CD.

5.5.7.4 Page: "About..."

Allows the Software Licence to be registered and to find out which version is installed.

Before and after registering the software:



6 Advanced usage

6.1 Using Rhapsodie.Net: General principles

Do not open multiple screens, navigate with screens

6.1.1 Project Storage directories

Rhapsodie projects are stored in the directory of your choice.

Let's take, for example, the directory: D:\FSA\Presses\

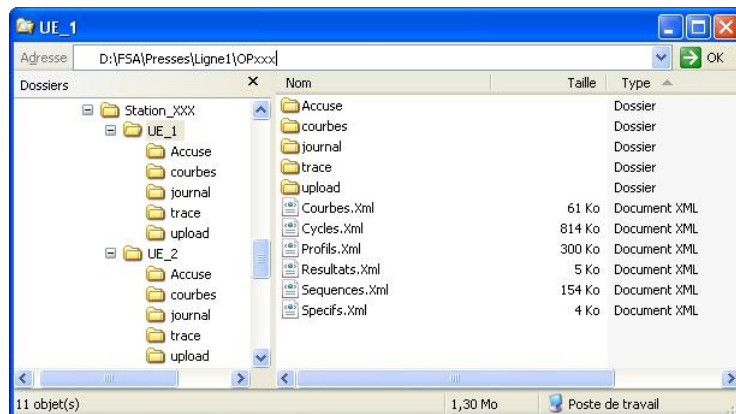
Within this directory, we will find the following structure:

```
D:\FSA\Presses\Line1\ OP110
                      OP120
                      OP130
                      OP140
Line2\ OP210
       OP220
       OP230
```

In each of the OPxx directories, you will find:



- The "project" file: .PJR
- The "Stations" directories (1 per station created in the project)
- Under each Station directory, as many "UE" directories as press-fitting units created
- Under each UE directory:



You will find all the xml files containing the cycles, sequences, profiles, etc.

The "Curves" directory contains all the curves stored during production when the PC was connected to the MVAT card.

6.1.2 Opening a project directly

If you don't want to change the data for a project, but just open Rhapsodie to view the curves produced for example, just double-click the corresponding .PJR file.

When you do this, Rhapsodie starts up with the unit page for the first station in the project, and the COM_MVAT communication interface starts along with VisuCourbes:



In this example, the "C" box is checked, so VisuCourbes has been started.

The  button is on a red background: the MVAT card related to the unit selected will not send curves at the end of the sequence.

If you want to view the curves being produced, just click this button (**Warning, NOT DURING PRODUCTION!**), the modification is sent to the MVAT card and on the next sequence, the MVAT card will send the curves.

The button then changes colour: 

6.1.3 Upload/Import/Export

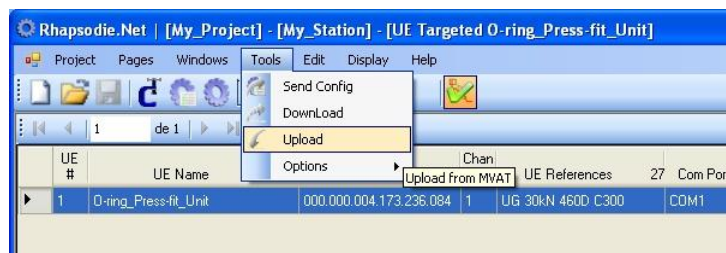
To use these functions, you must be logged on as "Creator"

These functions allow you to:

- Interrogate an MVAT card (UPLOAD) to retrieve the programs contained within it
- Replace the programs for the selected UE (IMPORT) by those retrieved from the MVAT card
- Export the programs for the UE selected in order to retrieve them onto another UE for example.

6.1.3.1 Upload (Retrieval of programs from MVAT)

After selecting the UE concerned, just select the following menu option:



or click the button 

Then, the order is sent to the MVAT card. In reply, it will send all its programs.

When this send is finished, a message appears on the screen showing the name of the .txt file.

The programs will therefore be stored in the form of a txt file in the "Upload" directory for the unit concerned.

6.1.3.2 Import

All that remains to be done is to import the txt file.

Before doing this, ensure all program pages are closed (Cycles, Sequences, Profiles, Specifications) to leave only the "Units" page.

You then select the unit involved, select the Project\Import menu and choose the desired txt file.

At the end of the import, all the programs for the selected unit are replaced by those in the txt file.

6.1.3.3 Export

This function allows all the programs for the selected UE to be exported to a text file.

This txt file may be re-imported in the same way as a txt file from an Upload.

6.1.4 Sending programs

To use these functions, you must be logged on as "Creator"

Each time a program is modified (Cycles, sequences, Profiles, Specifications), in order for the MVAT card to take into account the changes, you have to:

- Save the page being modified in Rhapsodie by pressing on the button 
- Send the new programs to the MVAT card by pressing on the button 

After each send has completed, a window shows the result of the download:

The correct result is: *"Download to MVAT terminated: OK"*

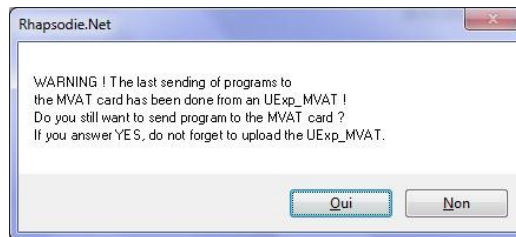
The following failure messages have the following meanings:

- *"Download to MVAT terminated: Timeout on transmission"*
 - ⇒ ComMVAT is not started
 - ⇒ The RS485 connection between the PC and Port COM2 of the MVAT is defective
 - ⇒ The MVAT card is not ready (in production?)
- *"Download to MVAT terminated: Too many NACKs"*
 - ⇒ The MVAT card has rejected the send (see the error number in the journal window of the ComMVAT module)

6.1.4.1 Case of communicating through an UExp-MVAT panel

If the machine is equipped with an UExp-MVAT panel (operating panel at the station, see §5.10***), before sending the programs to the MVAT, Rhapsodie.Net send to the MVAT controller an authorization request, to check that nobody modified the programs using the panel, in which case Rhapsody would most updated.

If you are in this case, a message box appears:



Then, the user has to decide between send notwithstanding (and then overwrite the modifications made from the panel), or cancel and update Rhapsodie programs with the "Upload from MVAT" button and the "Import" menu. (see §6.1.3 Upload/Import/Export p63).

6.1.5 Using the "List" pages

6.1.5.1 Copy/Pasting

The Cycles, Profiles and Sequence pages include a presentation of the data in the form of a table. This more compact but less readable presentation allows quick and efficient copy-pasting. For example, to duplicate cycle 1 (1001) 5 times to cycles 5 to 9, select row 1001 and right-click/copy

Cycle Number	Chain: if OK	Cycle Time	Holding Time	Max. Force	Trip Force	Min. Force	Gage Offset	Min. Diff.	Max. Pos.	Trip Pos.
1 001	2	99,00	0,50	55,0	50,0	10,0	0,000	42,300	42,100	0,000
			0,50	0,0	10,0	0,0	0,000	0,000	0,000	0,000
			0,50	550,0	500,0	450,0	0,000	5,700	4,300	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
6	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000

Then select rows 5 to 9 and right-click/paste

Number	if OK	Time	Time	Force	Force	Force	Offset	Diff.	Pos.	Pos.
1 001	2	99,00	0,50	55,0	50,0	10,0	0,000	42,300	42,100	0,000
1 002	3	99,00	0,50	0,0	10,0	0,0	0,000	0,000	0,000	0,000
1 003	513	99,00	0,50	550,0	500,0	450,0	0,000	5,700	4,300	0,000
4	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
5	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
6	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
7	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
8	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
9	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	120,0	100,0	50,0	0,000	40,100	39,900	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000

You can also select say a hundred or so cycles, copy and paste them into an Excel file, carry out bulk changes and paste them back into our list. (be careful however of certain values which are calculated by Rhapsodie from various checkboxes - the "Flag" columns in general)

6.1.5.2 Initialize (previously "Delete")

This feature initialize all the values, for the pages "Cycles", "Curves", "Profils" and "Sequences".

6.1.5.3 Consistency

This presentation also has the advantage of clearly highlighting any problems of consistency between programs created and used.

It allows a colour to be allocated to each cycle no., profile or sequence in order to check they are used correctly:

COLOUR CODE

Cycle Page	Cycle programmed and allocated to a sequence	Green
	Cycle allocated to a sequence but NOT programmed	Red
	Cycle programmed but not allocated to a sequence	Beige
	Cycle NOT programmed and NOT allocated to a sequence	White
Profile page	Curve programmed and allocated to a sequence	Green
	Curve allocated to a sequence but NOT programmed	Red
	Curve programmed but not allocated to a sequence	Beige
	Curve NOT programmed and NOT allocated to a sequence	White
Sequence page	Sequence OK	Green
	Sequence with cycle or curve NOT programmed	Red
	Sequence which loops back on itself (e.g. sequence 1 is allocated to cycle 1 which is chained to cycle 2 which is itself chained to cycle 1)	Salmon pink
	Cycle, curve or sequence number in error	Beige
	Sequence not programmed	White

6.2 How to backup projects

Just save the project directories(s) (D:\FSA\Presses in our example)

6.3 How to retrieve a project on another PC

The simplest way is as follows:

- Copy the directory for the project in question (the one containing the station directory, the .PJR file and the .RAP files, for example D:\FSA\Presses\Line1\Opxxx)
- Paste it into the PC\Destination directory (for example C:\My Documents\Presses\Line1\Opxxx)

Before the version V1.5.0.03, it's still necessart to :

- Edit the .PJR file
- Change the following line:

```
<StationPath>D:\FSA\Presses\Line1\Opxxx</StationPath>
```

- By updating the path to that for the new PC:

```
<StationPath>C:\My Documents\Presses\Line1\Opxxx</StationPath>
```

6.4 How to add/delete a Station to/from the project

In the Station page, a browser window lets you scroll through the various stations for the project.



The  button allows you to add a station, the  button allows you to delete it. Afterwards, the procedure for saving the station with the passwords, path and name is the same as when it was created.

6.5 How to add/delete a Press-fitting unit to/from the Station

In the Press-fit Units page, a browser window lets you scroll through the various units for the station.



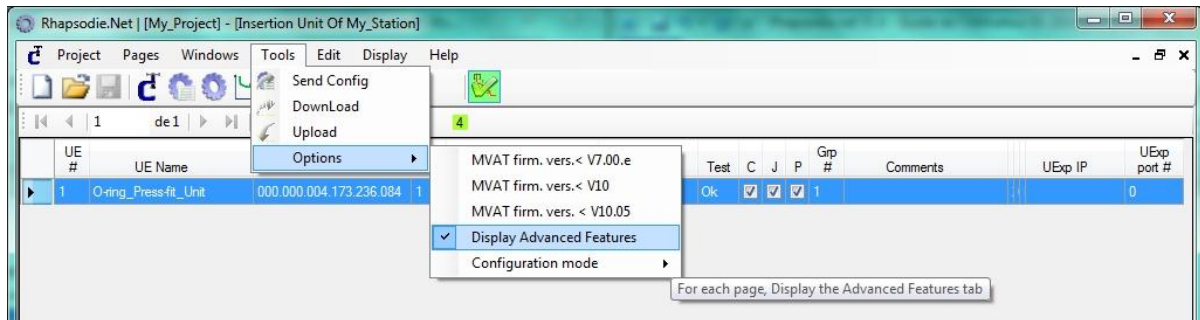
The  button allows you to add a unit, the  button allows you to delete it. Afterwards, the procedure for saving the unit with its name, identification, COM port, etc. is the same as when it was first created.

6.6 Results

This chapter is under construction, as the Rhapsodie page is in modification.

6.7 Advanced functions

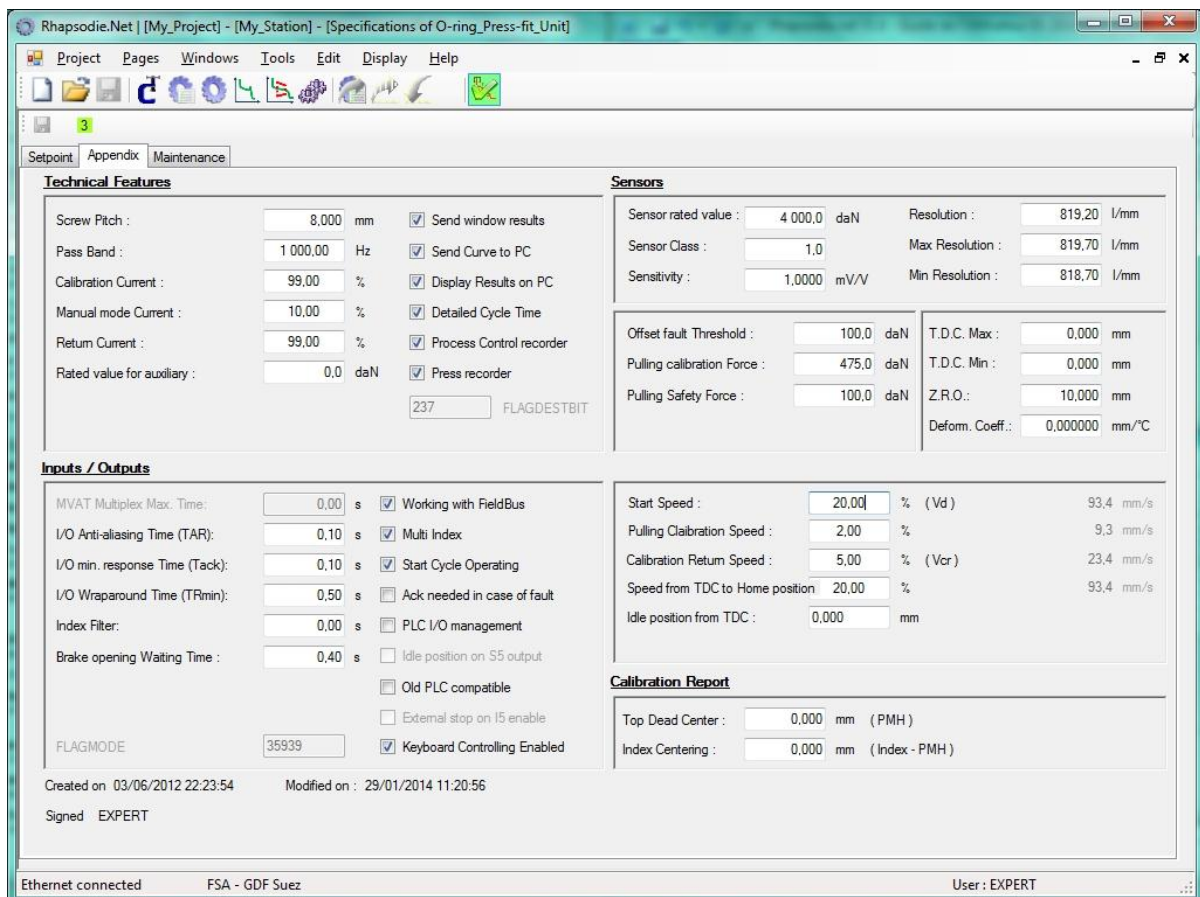
These pages become visible when the selection is checked:



From then on, when the specifications or Cycles pages are opened, one or more additional tabs are displayed.

6.7.1 Specifications page

6.7.1.1 "Appendix" tab



TECHNICAL FEATURES AREA:

Screw pitch: specifies the pitch of the roller screw in mm.

This field is only used by the MVAT card if the pin identification card is absent or defective.

To be entered only for pins which do not have an electronic identification or pins which do not appear in the "UE references" list

In this case, refer to the manufacturer's data (Equipment references section of the maintenance manual)

Pass Band: Value in Hertz of the pass band of the instrumentation amplifier, processed by the software. The default value is 1000 Hz.

Calibration current: specifies the maximum current that the speed controller can deliver during calibration in pressing or pulling mode. This value as a percentage is limited to 99%.

Manual mode current: specifies the maximum current that the speed controller can deliver during a manual ascent or descent. This value as a percentage is limited to 99%. For safety reasons as regards the mechanical environment of the press-fitting pin, a maximum value of 10% is strongly recommended.

Return current: specifies the maximum current the speed controller can deliver during the return to the origin position. This value as a percentage is limited to 99%.

Rated value for auxiliary: specifies the maximum of the range of a control auxiliary which can be connected to the MVAT. For example, for a load cell delivering 10 mV under a full load of 100 kN, we will enter 10000 daN in this field.

"Flag" definitions

Send window results: If this box is checked, at the end of each sequence, the MVAT sends over the RS232 link the results of checks carried out for each window defined in the storage program (curve).

Send curve to PC: If this box is checked, at the end of each sequence, the MVAT sends over the RS485 link the 2048 or 4096 points stored according to the storage programme (curve).

WARNING: the MVAT can take up to 1 second to build the curve block and this time has a direct effect on the cycle time. Sending this block to the PC via the RS485 link can take up to 1.5 seconds. This does not affect the cycle time and allows the "VisuCourbes" tool to draw the force/displacement curves.

WARNING: If no PC is connected during production, this box must be unchecked to avoid wasting time (the card makes 3 attempts to send the curves)

Display results on PC: Function disabled

Detailed cycle time: If this box is checked, the time of the last cycle carried out is displayed in the result block of the journal. If this box is not checked, the time displayed is the cumulative time from the start of the sequence.

Process control recorder: Monitoring mode for **Fabricom After-sales service**.

Press recorder: Monitoring mode for **Fabricom After-sales service**.

INPUT/OUTPUT AREA:

MVAT Multiplex max time (TMUX): specifies the maximum time allowed for multiplexing the inputs in automatic mode.

I/O Anti-aliasing time (TAR): specifies the anti-aliasing time for Inputs/Outputs

I/O Wraparound time (TRMin): specifies the MVAT minimum loop time

I/O min response time (Tack): specifies the minimum MVAT response time

Index filter: Allow the signal from the index (position detector) to be filtered by software to avoid the index being detected while the shaft is not on this position. This value must be between 0 and 0.08s.

Brake opening Waiting Time: Adjusts the time allowed to the brake to open before carrying out the Offset measurement at start-up. By default it is set to 400 ms.

"Flag" definitions

Working with Field Network: when checked means you are using a network such as PROFIBUS DP or ETHERNET for the dialogue between MVAT and the PLC.

Multi index: Check the "Multi index" box to use the 4 "index offset" positions in the "Maintenance" tab.

Start cycle operating: validates the use of a "Cycle start" signal to launch either a press-fit sequence or a calibration, or a manual raise or lowering operation. Apart from FABRICOM AFTER-SALES SERVICE, this box must **always** be checked.

Ack needed in case of fault: when this box is checked in manual mode authorises continuation of execution with acknowledgement in case of fault. To continue execution with acknowledgement in case of fault, do not check.

PLC I/O Management: this box switches from automatic mode to manual mode. Checked means automatic mode, and unchecked manual mode.

Idle position on S5 output: when this box is checked, it activates the change of output S5 of the MVAT to level 1 when the pin reaches its origin position. This field is greyed out and unchecked if the "Idle position from TDC" field is equal to 0.

Old PLC Compatible: this box allows disabling the fallen bit to 0 of « Cycle On» bit, between 2 cycles, SOFT chained without API authorization. Only the quality of the last cycle is known by the PLC.

External stop on I5 enable: this box allows an external ON/OFF signal connected to input I5 to cause a trip rather than a position or a force.

Keyboard controlling enabled: To directly control the press from the keyboard, this box must be checked. The control commands are sent exclusively by a UExp-MVAT connected to the MVAT card.

SENSORS AREA:

Sensors					
Sensor rated value :	4 000,0	daN	Resolution :	819,20	I/mm
Sensor Class :	1,0		Max Resolution :	819,70	I/mm
Sensitivity :	1,0000	mV/V	Min Resolution :	818,70	I/mm

Sensor rated value: rated value in daN of the Force sensor fitted to the press-fitting pin.

Sensor Class: OPTION. Authorises a limitation or overrun of the rated force (1 by default otherwise AS AN OPTION value between 0.8 and 1.2)

Sensitivity: number of millivolts delivered by the force sensor for every 1 volt of power supply voltage when stressed to its rated value. 1.000 mV/V is the default value.

Resolution: After the machine has been calibrated, the MVAT card calculates this value and displays it in the calibration result block in the journal under the title "Resolution depl."

(See Appendix, [Journal](#), calibration of bottom and top gages).

It must be updated by the user in Rhapsodie.net.

Max. resolution: Maximum value that the number of pulses/mm found during the calibration cycle must not exceed. If the number of pulses/mm is greater than the maximum resolution, the calibration is not confirmed and the new settings calculated are not taken into account by the MVAT which declares an incorrect calibration by output S6. A check must be made that the gages are of the correct thickness.

Min. resolution: Minimum value that the number of pulses/mm found during the calibration cycle must not exceed.

If the number of pulses/mm is less than the minimum resolution, the calibration is not confirmed and the new settings calculated are not taken into account by the MVAT which declares an incorrect calibration by output S6. A check must be made that the gages are of the correct thickness.

Entry of the last two settings is essential to the operation of the machine. A fault is enabled if they are not specified.

FORCE AREA:

Offset fault Threshold :	100,0	daN
Pulling calibration Force :	475,0	daN
Pulling Safety Force :	100,0	daN

Offset fault Threshold: Value in daN of the maximum force offset tolerated at idle. If this value is exceeded, the card will refuse to start a cycle and a fault number is shown in the result block ([fault list](#)). A value equivalent to 10% of the rated value of the sensor is recommended.

Pulling calibration force: Value in daN of the force used during pulling calibration of the machine. This value must be greater than the largest pulling force programmed in the cycles and be between 0.25 and (1 times the rated - Offset fault threshold).

Safety Return Force:

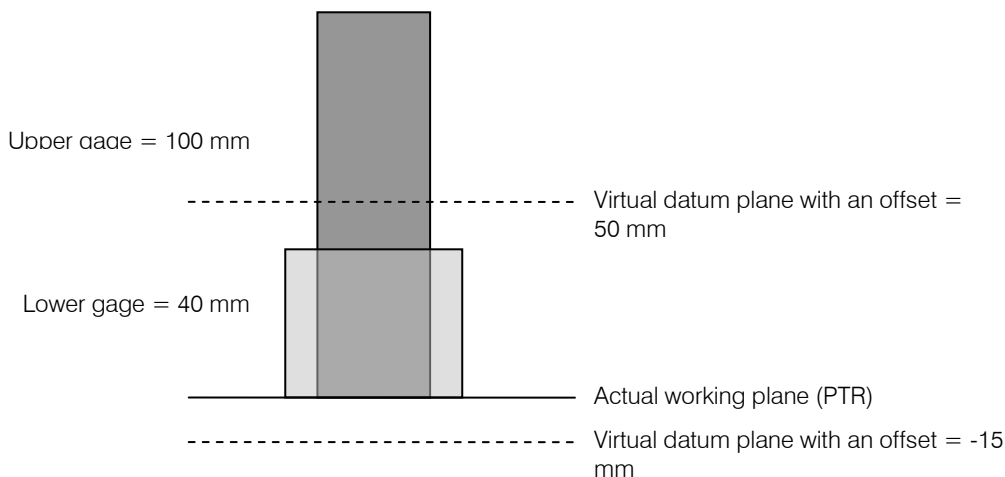
- Value in daN of the maximum force authorised during the return travel of the pin. During this return travel, the force is continually checked and must not exceed this programmed value
- Value in daN of the maximum force authorised during the manual raise

TDC AREA

T.D.C. Max :	0,000	mm
T.D.C. Min :	0,000	mm
Z.R.O.:	10,000	mm
Deform. Coeff.:	0,000000	mm/°C

T.D.C. Max./ T.D.C. Min.: When carrying out a calibration without gages, these fields protect the quality and consistency of the lower gage calibration.

Z R O (Offset from Actual Working Plane): This field offsets the **Actual working plane** (PTR), i.e. the "zero" obtained on calibration (bearing surface of the lower gage) in a positive or negative direction to obtain a **Virtual datum plane**(PRV).



Coeff. Déform : : Provided that a external temperature sensor is connected to the spindle (to measure the temperature of the frame for example), this coefficient is used to correct the press aperture when the ambient temperature evolves. To help the user to evaluate practically the value of this coefficient, it's possible to make 2 calibrations at 2 different temperature, and then, after the second calibration, the MVAT card calculate this coefficient and gives the result into the terminal result. (only if a preliminary value has been entered first to activate this correction)

SPEEDS AREA:

Start Speed :	20.00	% (Vd)	100.0 mm/s
Pulling Claibration Speed :	2.00	%	100.0 mm/s
Calibration Return Speed :	5.00	% (Vcr)	100.0 mm/s
Speed from TDC to Home position	20.00	%	100.0 mm/s
Idle position from TDC :	0.000	mm	

Starting Speed: used at the start-up of the pin between the idle position and TDC.

(See [Position and speed diagram](#)).

This is a percentage value limited to 20% maximum.

In calibration mode, it is only used on the return to idle position between TDC and the idle position.

Pulling Calibration Speed: this is used during pulling calibration of the machine between the lower shaft position (obtained using a standard cycle with returning to idle position) and the moment where the pin encounters the pulling calibration force. This is a percentage value limited to 20% maximum. The lower this speed (from 1 to 3%), the better is the pulling calibration.

Calibration Return Speed: this is used between the position where the pin stopped during pressing calibration or between the lower pulling calibration position and the first PULSE after the indexer. This is a percentage value limited to 99 % maximum.

Speed from TDC to Home position: this speed is used for the return to idle position. If this value is 0, a default value of 20% is applied. This value as a percentage is limited to 20%.

Idle position from TDC: specifies the idle position relative to TDC. A value of 0 is strongly recommended (in this standard case, the idle position is PULSE-1). Otherwise, the value must between the "Index centring" value and the screw pitch.

CALIBRATION REPORT AREA

Calibration Report	
Top Dead Center :	0.000 mm (PMH)
Index Centering :	0.000 mm (Index - PMH)

Top Dead Centre: This position equates to the position of the 1st resolver or coder pulse encountered by the unit when the shaft exits. All position values are initialised when this PULSE is passed. The distance between Top Dead Centre and the position of the Virtual Datum Plane (machine table or reference 0) is called "**Press opening**" (see [Position and speed diagram](#)). After the machine has been calibrated, the MVAT card calculates the press opening and displays it in the calibration result block in the journal. The value thus obtained must be entered by the user in Rhapsodie.net in the Top Dead Centre field.

Index centring: After the machine has been calibrated, the MVAT card calculates this value and displays it in the calibration result block in the journal under the title "Index entering". It must be updated by the user in Rhapsodie.net. This value in mm gives the distance between the index (position detector) and the first pulse given by the coder when the shaft exits (see [Position and speed diagram](#)). The index entering value must be very close to half the screw pitch.

6.7.1.2 "Maintenance" tab

Rhapsodie.Net | [My_Project] - [My_Station] - [Specifications of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

Setpoint Appendix Maintenance

Working mode description

Offset : 0,0 daN ☐ AutoTest mode
 Max. Offset : 1 200,0 daN ☐ Step by Step mode
 Pressing deformation : 0,000 mm ☐ Semi-Manual mode
 Pulling deformation : 0,000 mm ☐ Overpowering sensor allowed
 Calibration table linearization : 0 Calibration mode With gages
 Decel. Ramp to reach TDC: 5,000 mm Sensor adjust. With Power
 Gamma cst (Approach anticip.) 30 ☐ Switch off Magnetic holding
 Gamma2 cst (return anticip.) 30 ☒ Step Synchro
 COM2 watchdog: 5,00 s **Multiple Index**
 COM2 watchdog on Upload: 50,00 s Index1 Offset 0,000 mm
 Overload max. factor : 1,200 Index2 Offset 0,000 mm
 FLAGMODE: 35939 Index3 Offset 0,000 mm
 FLAGSPECIAUX: 129 Index4 Offset 0,000 mm
 Servodrive Type : Infranor-CD1a

Reserved for future features

Return Inertia Time : 0,00 s Result Request Cancelling ☐
 Speed slope Time : 0,00 s Pressing/Pulling curve ☐
 Speed Offset : 0,00
 RS485 intra-char. time 0,000000 s Timing by COM1 ☒

Created on 03/06/2012 22:23:54 Modified on : 29/01/2014 11:47:40

Comments :

Imported on 03/06/2012 22:23:54 by EXPERT
 From file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53
 Created on 03/06/2012 22:22:53

Signed: EXPERT

Maintenance Department

Greasing Warning threshold: 100 000 Sequences
 Greasing Shut down threshold: 120 000 Sequences
☐ Shut down if threshold reached **Greasing Done**

Quality Department

Sensor Adjustment

Max. Force correction : 10,00 %
 Press Sensor Measurement : 2 823,0 daN
 Checking Sensor Measurement : 2 746,0 daN

Ethernet connected FSA - GDF Suez User : EXPERT

WORKING MODE DESCRIPTION AREA

Offset: This is the offset value given after calibration has finished.

It can be entered in Rhapsodie.net, but the MVAT card keeps it in memory anyway.

Max. offset: This is the maximum value tolerated for the offset at the end of calibration.

Pressing deformation: This the max value in mm tolerated for the distortion of the frame with the pin in pressing mode. The value 0.00 disables this test.

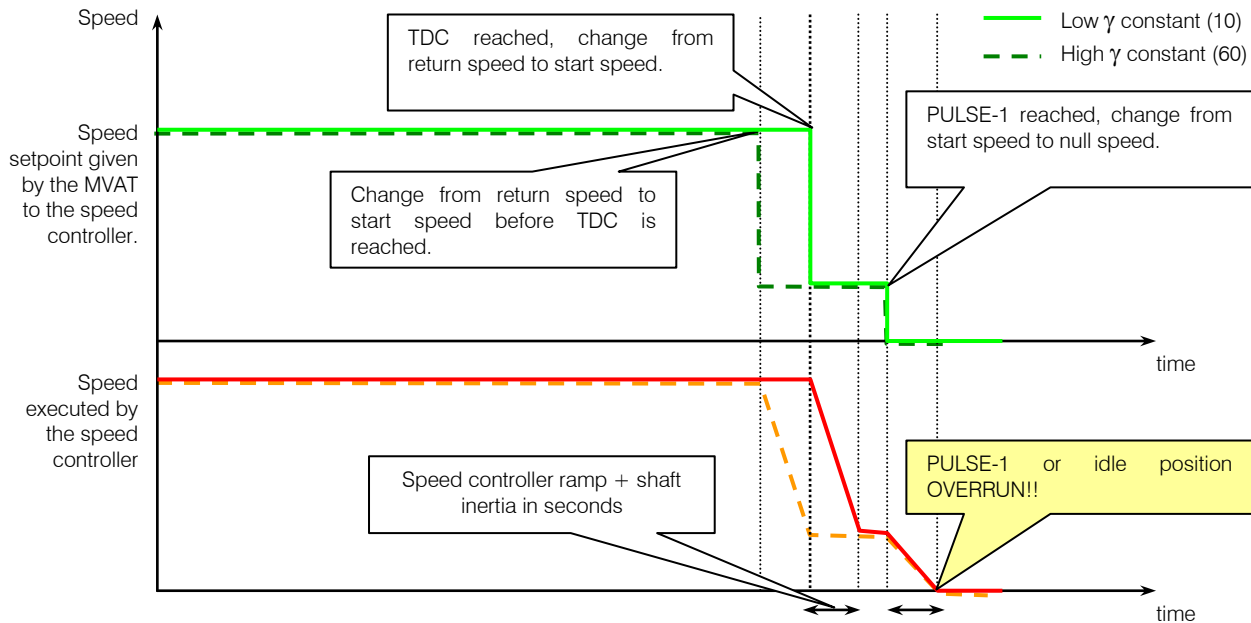
Pulling deformation: This the max value in mm tolerated for the distortion of the frame with the pin in pulling mode. The value 0.00 disables this test.

Calibration table linearisation: During calibration, the MVAT card saves the distortion table for the frame. This setting enables the first 8, 16 or 24 recordings to be linearised in order to filter any spurious values or mechanical sticking points.

Decel ramp to reach TDC: Determines the distance over which the UE decelerates to change from the return speed to the start speed.

Gamma2 cst (Approach anticip.): This value allows the MVAT to anticipate the travel of the shaft while slowing down during its outward movement. Indeed, depending on the acceleration/deceleration ramp of the speed controller, and the potential inertia of an embarked tool, the shaft may overrun the approach position during its outward movement.

Gamma2 cst (return anticip.): This value allows the MVAT to anticipate the slow down travel of the shaft during its return. Indeed, depending on the acceleration/deceleration ramp of the speed controller, and the potential inertia of an embarked tool, the shaft may overrun its idle position during its return.



Example illustrated: ramp = 0.05 secs

To avoid these overruns, **avoid as far as possible programming a ramp** in the operation of the speed controller.

COM2 watchdog: This is the maximum time allowed for the MVAT to send curve files to the PC via the RS485 link. The value 3s is entered by default.

COM2 watchdog on upload: This is the maximum time allowed for the Upload (upload of the program from the MVAT via the RS485 link. The value 50s is entered by default.

Overload max. factor: this coefficient limits the over-classification of the press-fit unit. If the "Class" value of the "Appendix" tab is greater than this coefficient, the MVAT will generate a "Sensor rating fault".

"Flag" definitions

Auto Test mode: In this mode (reserved to **FSA After-Sales Service**), the press-fit unit executes sequence no.1 in a loop and sends a special result block at the end of each sequence.

This mode allows execution of the "Esc" "t" keyboard command to be checked. However, to validate execution of this command, the "Start cycle operating" field in the "Appendix" tab of the "Specifications" must not be checked and button Dcy must be set to 1.

Step-by-step mode: This mode, which can only be used when operating without a PLC allows execution of a sequence to be shut off by releasing the cycle start button. When the cycle start is released, the sequence is interrupted until the cycle start is set back to 1. By combining this mode with semi-manual mode, the value of the force and movement during the execution of the sequence may be viewed dynamically.

Semi-manual mode: This mode, which can only be used when operating without a PLC, allows the value of the force and movement during the execution of the sequence to be viewed dynamically.

Calibration: this field must be set to "With gauges" as the other option is reserved for special cases.

Sensor adjust: this field enables the correction mode for the force to be selected. If "With power" is selected, the sensitivity correction is carried out by adjusting the power supply of the gauge bridge. If "Rated" is selected, the correction is made by adjusting the rated value. It is strongly recommended to always work in "With power" mode.

Overpowering sensor allowed: This box must **never** be checked when controlling FABRICOM pins.

Step Synchro: this field **must** be checked when working with a PLC.

Switch off magnetic holding: this field must be checked by default in order to maintain the servo-control of the motor until the cycle start is released. Warning: after 15 secs, the servo-control will be automatically released as the automatic control system will have activated (by voltage loss) the electromagnetic brake.

Entrées/Sorties

MVAT Multiplex Max. Time:	0.00	s	☒ Working with FieldBus
I/O Anti-aliasing Time (TAR):	0.10		☒ Multi Index
I/O min. response Time (Tack):	0.10	s	☒ Start Cycle Operating

Note: Multi Index can only be enabled if the "Field Bus" box is also checked.

Multiple Index

Index1 Offset	0,000	mm
Index2 Offset	0,000	mm
Index3 Offset	0,000	mm
Index4 Offset	0,000	mm

*The opening of the press is available using the (E) command. The maximum offsets must be less than the press opening - 2 + P (screw pitch).

Le schéma illustre la configuration de câblage pour le Boîtier Multi-Index. Les connexions sont les suivantes :

- Broche** : Connectée au **Câble Multi-Index MES/IND EP**.
- Index 1, 2, 3, 4** : Connectés au **Boîtier Multi-Index**.
- Boîtier Multi-Index** : Connecté au **Châssis MVAT** via le **Câble MVAT CAB/MES EP**.
- Boîtier Multi-Index** : Connecté au **Bornier Armoire** via le **Câble MVAT CAB/ESI-API EP**.
- Bornier Armoire** : Connecté au **Châssis MVAT** via le **Alim. 24v Auxiliaire MVAT (SI > 1 Index supplémentaire)**.
- Bornier Armoire** : Connecté au **Bloc E/S Automate** via le **Câble MVAT CAB/ESI EP**.

If the selection echo or index-N is not correct, FB_XCHG_INDEX=0. If index-N is not correct when the pin starts, a standard fault FBV BRCH HAUT=0 is obtained.

Important:

Changing from index-N to another requires going through a positioning cycle to Index0.

RESERVED FOR FUTURE RELEASES AREA:

Result request cancelling:

The results are no longer sent to the coupler.

Pressing/pulling curve: set to "YES" to enable the force and displacement of the UE in pulling and pressing mode to be recorded in the same curve window (Expansion).

Initial from the last acquisition cycle: set this field to "YES" for cycles in relative mode to be carried out according to the acquisition cycle.

set this field to "NO" for cycles in relative mode to be carried out according to the previous cycle.

Timing by COM1:

This box must always be checked.

MAINTENANCE DEPARTMENT AREA

Greasing warning threshold: When this threshold is reached, a "Greasing Alert" message is added in the sequence result block.

Greasing Shut down Threshold: When this threshold is reached, a "Greasing Shutdown" message is added in the sequence result block.

Shut down if threshold reached: if this box is checked, the press will shut down when the Greasing Shutdown Threshold is reached. It will not be possible to restart it until the "Greasing Done" button is pressed.

QUALITY DEPARTMENT AREA:

Without correction

With correction

Allows a linear correction to be made to the sensitivity to make the value given by the MVAT correspond to that given by the test equipment.

This correction is logically irrelevant as the MVAT corrects the force dynamically in accordance with the values measured when the shaft fitted with instruments was calibrated.

It may be necessary when an incorrect application of the force generates a **repetitive and linear** error at the test equipment. An offset between the two measurements may under no circumstances be cancelled by this correction.

Max. force correction: This is the maximum allowed correction as a percentage. It is limited to 10%.

Press sensor measurement: For the largest force applicable by the press-fit unit, we read off the force measured by the MVAT.

Checking sensor measurement: In the same test, the value input here is the value given by the test equipment.

Note: do not enter a non-zero value in the max. force correction field if the press sensor measurement and the checking sensor measurement fields are both 0.



Example:

UG30kN
 MVAT setpoint: 2,800 daN
 Press sensor measurement: 2,823 daN
 Checking sensor measurement: 2,746 daN

6.7.2 Cycle Page

6.7.2.1 "Advanced" tab

Rhapsodie.Net | [My_Project] - [My_Station] - [Cycles of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

de 384 2

Sheet List Advanced

Max. Cycle time : 99,00 s

Position difference Calculation

Position diff. calc with: Previous pos. ▾

Calculation Offset : 0,000 mm

Max. diff. calc. : 0,000 mm

Min. diff. calc. : 0,000 mm

Limited Force checking ?

Start of checking : 0,000 mm

End of checking : 0,000 mm

Limited Force : 0,0 daN

☐ **Force Before Stop (F.B.S.)** ?

FBS distance : 0,500 mm

Max. FBS : 0,0 daN

Min. FBS : 0,0 daN

☐ **Force Following Mode activated**

Force to follow : 0,0 daN

Delay Time : 0 ms

1st Multiplier : 0

2nd Multiplier : 0

Option for relative displacement

☐ Positioning cycle relative to the last acquisition cycle

☐ **Slope Tripping mode Activation** ?

Force threshold to start Observ. : 0,0 daN

Offset/threshold OR Start Observ. pos : 0,000 mm

Slope changing detection Rate : 0,0

Observation Window : 0,0 daN

Flag Cycle : 314 578
0

Ethernet connected FSA - GDF Suez User : EXPERT

Max. Cycle time: Maximum total time for the cycle from the start of the cycle until the pin returns to idle position or until the start of the next chained cycle.

POSITION DIFFERENCE CALCULATION AREA

Position diff. calculation with: If "Initial" is selected, the position difference calculation along with the quality check (Min difference < Position difference < Max difference) will be carried out relative to the position obtained during the acquisition cycle. If "Previous pos." is selected, the position difference calculation along with the quality check will be carried out relative to the position obtained during the previous cycle.

Calculation offset: Value in mm which will be deducted from the "Position difference" calculation

If a gauge (or a spacer) is used for the acquisition cycle which will then be removed for the press-fit cycle, the value of the calculation offset to be entered will be the position of the gauge (or the spacer).

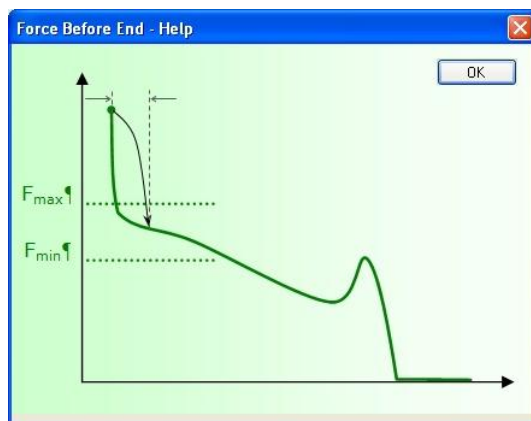
If no gauge or spacer is removed between the acquisition cycle and the press-fit cycle, the value 0.00 must be entered.

Max. diff. calc.: Maximum value in mm that the position difference between the acquisition cycle (initial position) and the press-fit cycle (final position) must not exceed for the cycle to be declared OK. If no value is entered, this setting is not taken into account by the quality check. This value is not taken into account in an acquisition cycle.

Min. diff. calc.: Minimum value in mm that the position difference between the acquisition cycle (initial position) and the press-fit cycle (final position) must not exceed for the cycle to be declared OK. If no value is entered, this setting is not taken into account by the quality check. This value is not taken into account in an acquisition cycle.

FORCE BEFORE STOP AREA

When the  button is clicked, the following help window opens:



This function provides a simple check of the pressing-fitting operation for a part which is press-fitted fully home. This check is carried out at the end of cycle or end of sequence. This function requires the use of a force storage program associated with the sequence.

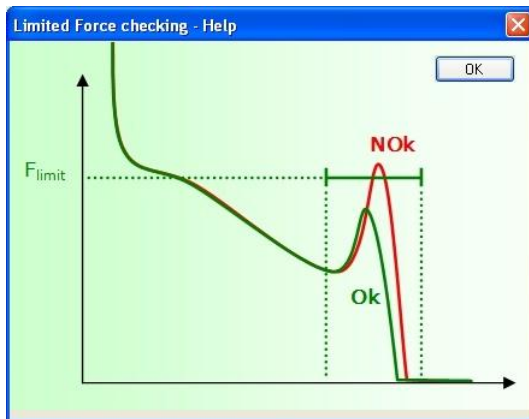
Force Before Stop (FBS): If this box is checked, the other fields become accessible and this function activates.

FBS distance: This is the distance between the position reached when pressed home as far as it will go (last point) and the measurement of the force to be checked.

Max. FBS/Min. FBS: These are the maximum and minimum allowed at the distance before stop. They are used to ensure correct binding for a part press-fitted fully home.

LIMITED FORCE CHECKING AREA

When the  button is clicked, the following help window opens:



This function prevents the press-fitting of a non-compliant part (incorrect fitting, insufficient entry bevel, etc.). The sequence is stopped and the part can be recovered. This function does not require the use of a force storage program associated with the sequence.

Start of checking: This is the absolute start position for checking.

End of checking: This is the absolute end position for checking.

Limited force: If this force is reached between the monitoring start and end positions, the sequence is interrupted with fault no. 97.

FORCE FOLLOWING MODE ACTIVATED AREA

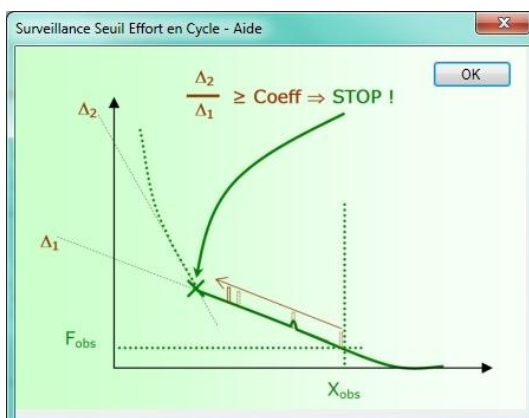
Force to follow: If a force is entered, the press will stop its travel when this force is reached, then continue if the force reduces again. If the trip force or trip position are reached, the cycle terminates in the normal way. Otherwise, to stop the cycle, the stop on external signal may be used.

Delay time :

1st Multiplier :

2nd Multiplier :

Slope Tripping mode area



☒ Slope Tripping mode Activation 	
Force threshold to start Observ. :	0,0 daN
Offset/threshold OR Start Observ. pos. :	0,000 mm
Slope changing detection Rate :	0,0
Observation Window :	0,0 daN

Force threshold to start and **Offset/threshold:** If a force is entered, the press will look after this force, and as soon as this force is reached, the seeking of slope changing will start. If an offset is entered, the seeking will start after this offset.

If no force is entered (value 0,0 daN), the seeking will start at the "Start Observ. Pos." position.

Slope changing detection Rate : The slope of the curve is calculated permanently, and as soon as the ration of the new slope divided by the previous one is more than this value, the press will stop and finish its cycle.

Observation window : To calculate the slope independantly of the fast variations of the measurment, the average slope is calculated on a force interval than you can adjust with this parameter.

6.7.2.1 "Page" tab - Force Check Cycle type

When this type of cycle is chosen, certain fields have a different role relative to the other types (press-fitting, positioning).

This type of cycle allows an auxiliary device to be controlled. The typical case is searching for a spline. The press descends, and if the pinion to be press-fitted is not opposite the splines, the force is stopped and an auxiliary device is controlled which turns the shaft or the pinion, and when the force drops (splines facing each other), the press restarts.

Trip force: Value of the Force in daN which gives the order to stop the pin (null speed).

If when this force is reached, the position measured is not within the Max position/Min position window, the pin stops, and the auxiliary device is not triggered. The cycle is declared "NOT OK".

If when this force is reached, the position measured is within the Max position/Min position window, the pin stops, and the auxiliary device is triggered until the force passes below the "Force loss threshold", when the cycle is declared "OK".

If the position measured reaches the stop position before the force is reached, the pin stops and the auxiliary device is not triggered, but the cycle is declared "OK".

If the position measured reaches the stop position with a force greater than the "Force loss threshold", the pin stops and the auxiliary device is not triggered. The cycle is declared "NOT OK".

If no value is entered, the default value is the Maximum Force.

Force loss threshold: This value must be much less than the Trip force. The stop order to the auxiliary device is given when the force passes below this value. If no value is entered, the MVAT outputs an error number.

Minimum force: Field disabled in this mode.

Trip position: It is essential that when this position is reached, a force at least equal to the trip force has already been encountered or that no force was encountered, otherwise, the MVAT signals a fault. If no value is entered, the pin stops on the trip force (auxiliary triggered) or on the Lower safety position (default).

6.8 Calibration and learning cycle in pressing mode

6.8.1.1 Definition

This cycle teaches the MVAT controller the deformation of the frame in pressing mode under a configurable force that must be greater than or equal to the maximum force encountered in pressing mode. It also determines the value of the "Index Centring" setting and the travel resolution.

6.8.1.2 Description

This cycle must be executed with a mechanical stack which includes tools fixed to the tip of the pin and others fixed to the frame (so that their own deformation is also "learnt" by the MVAT). Use of workstation compliances (springs, etc.) which upset the learning process should be avoided.

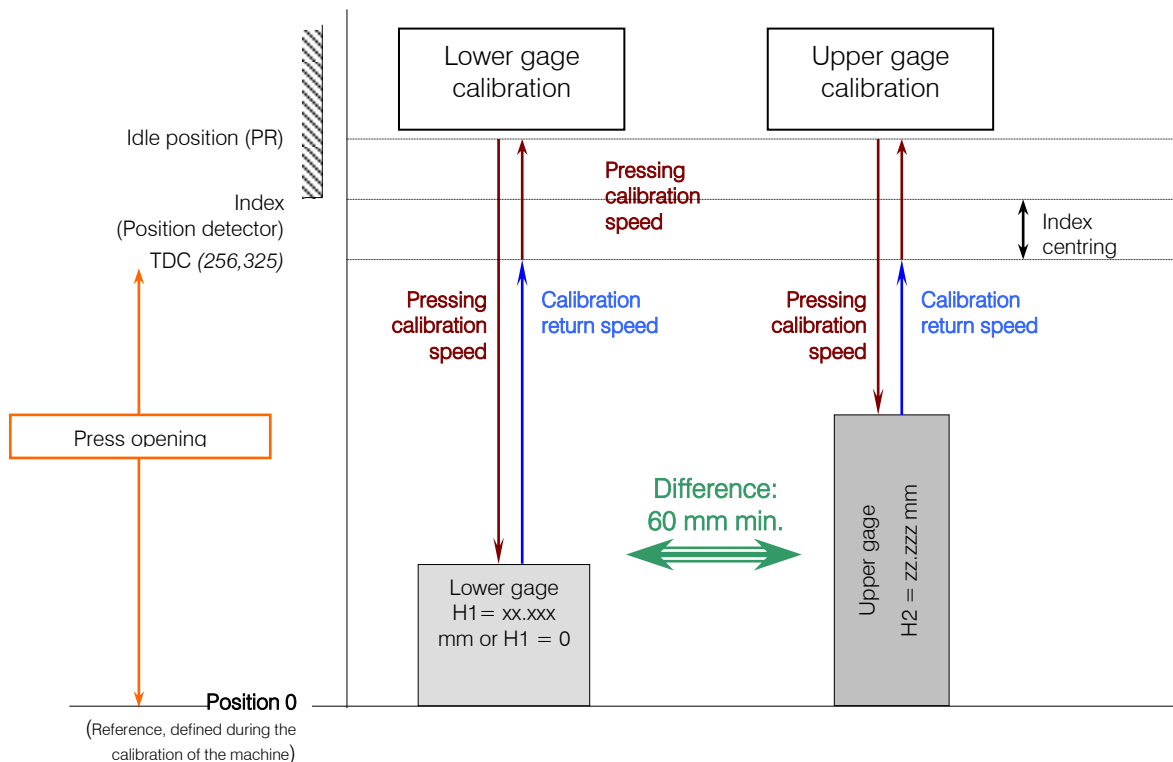
It consists of successively applying a calibration force on two gages whose height is known to the micron.

WARNING:

- the difference in height between the gages must be at least **60 mm** to ensure correct resolution (typical UE travel of 500 mm).
- the press-fit unit will refuse to carry out a sequence until an initial calibration has been carried out. Only manual movements are allowed.

The first gage, called the "lower gage" is placed in position and a "lower gage calibration cycle" is launched. The shaft of the pin exits at a configurable speed until the tip of the shaft or the end of the tool comes into contact with the lower gage. The pin then applies an increasing force, and when the calibration force is reached, the shaft raises back up to the idle position.

The second gage, called the "upper gage" is then placed in position and an "upper gage calibration cycle" is launched. The shaft of the pin exits at a configurable speed until the tip of the shaft or the end of the tool comes into contact with the upper gage. The pin then applies an increasing force, and when the calibration force is reached, the shaft raises back up to the idle position.



At the end of this last cycle, a "calibration result" block is displayed on the journal, giving the resolution, the index centring and the press opening.

The calibration curve (deformation in μm as function of the force) may be viewed using VisuCoube by opening the upload file for the unit. (see Visucourbes.Net manual).

6.9 Calibration and learning cycle in pulling mode

6.9.1.1 Definition

This cycle teaches the MVAT the deformation of the frame in pulling mode under a configurable force that must be greater than or equal to the maximum force encountered in pulling mode.

6.9.1.2 Description

This cycle must be executed with a mechanical stack which includes tools fixed to the tip of the pin and others fixed to the frame (so that their own deformation is also "learnt" by the MVAT).

It involves applying a pulling calibration force on a calibration tool.

WARNING:

If a pressing cycle is followed by a pulling cycle, and the pulling calibration has not yet been carried out, the press-fitting unit will refuse to execute the pulling cycle.

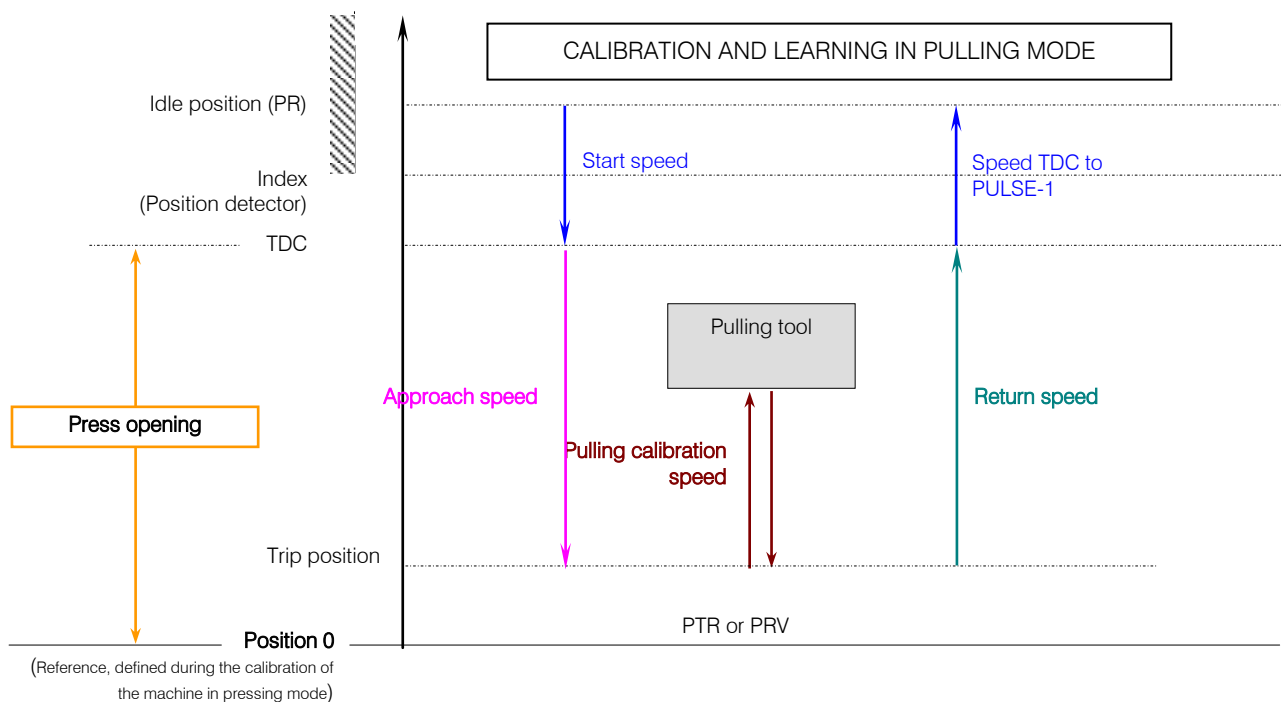
If the various programmed pulling cycles exercise a pulling force relevant to the process and accurate positioning is involved, it is essential to carry out pulling calibration each time the electrical or mechanical environment of the press-fitting unit is changed.

A "pulling calibration cycle" is run. The pin executes sequence no. 1, standard press-fit, in which the return to home position is not requested. The shaft therefore stops in an "exit" position. The pulling tool is fitted.

The cycle is continued. The pin shaft returns at a configurable speed until the pulling tool comes into contact. The pin then applies an increasing force, and when the calibration force is reached, the shaft comes back out to the previous bottom position.

The pulling tool is removed and the shaft returns to its home position.

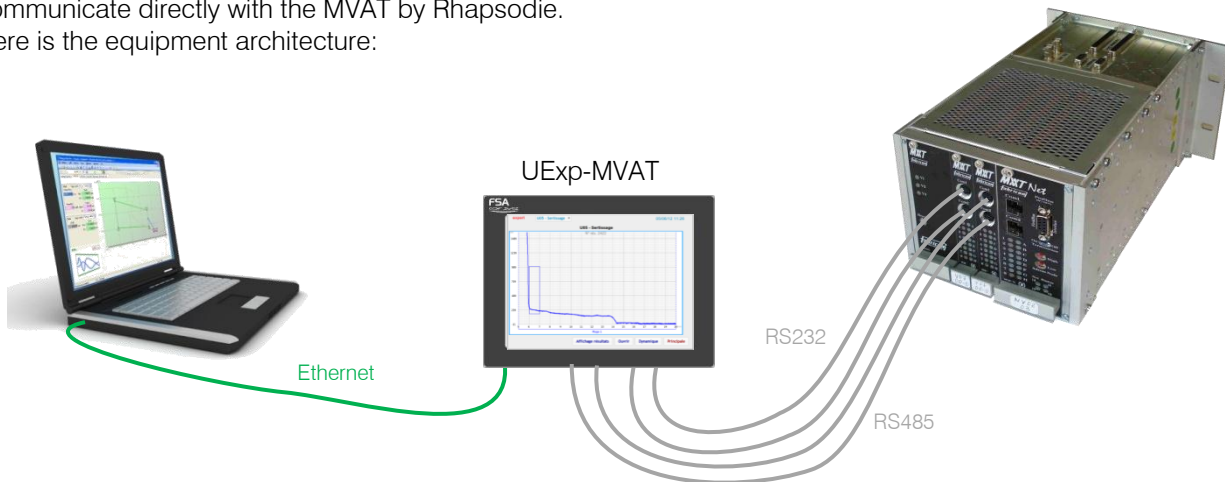
At the end of this last cycle, a "calibration result" block is displayed on the journal, giving the resolution, the index centring and the press opening.



6.10 Using a UEXP-MVAT and the communication tools

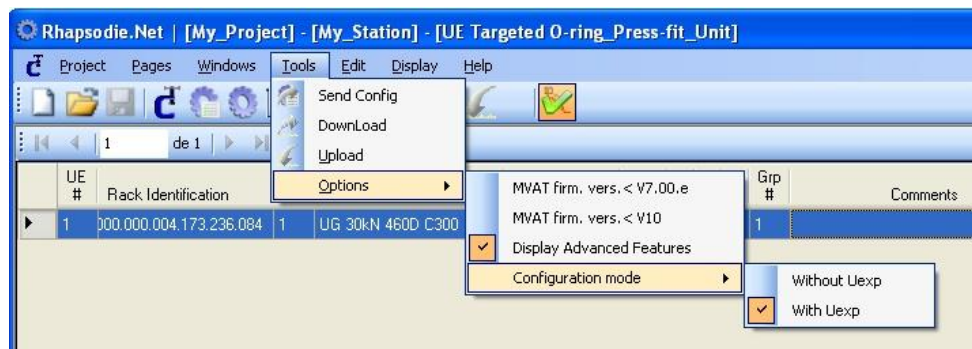
If you are using a UEXP-MVAT, which is connected directly to the MVAT card, no serial port is available to communicate directly with the MVAT by Rhapsodie.

Here is the equipment architecture:



A software (Com0com), which is install by Rhapsodie, create virtual ports on the PC. These virtual ports are redirected to Ethernet by another software, Com2tcp (included into com0com software).

You have to connect the PC to the Ethernet Port 1 of the UEXP-MVAT, and configure into Rhapsodie :



Then, two new columns appears :IP_UEXP and Num Port UEXP

The screenshot shows the Rhapsodie.Net software interface with the configuration table. The table has the following columns: UE #, Rack Identification, Chan #, UE References, 27, Com Port, Test, C, J, P, Grp #, Comments, IP_UEXP, and Num Port UEXP. The table contains one row with the following data:

UE #	Rack Identification	Chan #	UE References	27	Com Port	Test	C	J	P	Grp #	Comments	IP_UEXP	Num Port UEXP
1	000.000.004.173.236.084	1	UG 30kN 460D C300		COM1	Ok	✓	✓	✓	1			0

For "IP_UEXP", you've have to enter the IPV4 of the UExp-MVAT used (ex : 172.16.2.50).

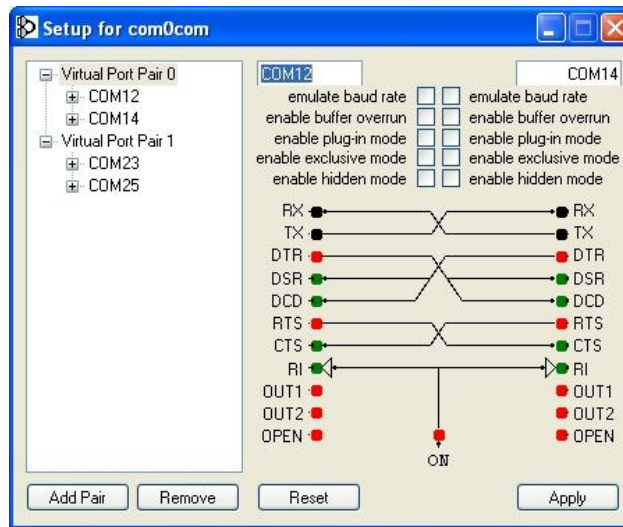
For the Num Port, if the unit is connected on the first "channel" of the UExp-MVAT (serial port 3 and 4 of the UExp), then type **2217**

If the unit is connected on the second "channel" of the UExp-MVAT (serial port 5 and 6 of the UExp), then type **2218**

To choose the COM Port, you have to click on the button:



Then the setup window of the com0com tool appears:



For each Unit into your project, you should have 2 pairs of Com Port. One is for the RS232, and one is for the RS485. In our example, when closing this window, the Com Port of the unit will be COM25 (the output port of the second pair).

Then, if you click on the "Launch Com Button",  the Com Port will be redirected to the MVAT by the PC and the UExp (DO NOT FORGET to DISCONNECT the COM PORT into the UExp Menu before), and a terminal, connected on the RS232 of the MVAT card will be launch.

7 Additional information

7.1 Number of sequences, cycles and curve acquisition programs

512 resident sequences are available in the MVAT card.

These 512 sequences can be selected by the PLC by multiplexing the MVAT inputs. They all relate to a "cycle(s)/curve" combination. These sequences are managed in the PLC according to chronograms DIAG_ES1, DIAG_ES3 and DIAG_ES5

(See maintenance manual, "Chronograms")

In addition to these **512** sequences, **8** fixed selections are used to carry out the following actions:

- **513**: return to home position
- **514**: Upper gage pressing calibration
- **515**: Lower gage pressing calibration
- **516**: Pulling calibration
- **517**: Pulling calibration
- **518**: Manual shaft return (MVAT output S5 changes to 0 when the index is reached)
- **519**: Manual shaft exit
- **520**: Manual shaft return/exit

These sequences are selected in the same way by multiplexing the MVAT inputs. These sequences are managed in the PLC according to chronogram DIAG_ES4.

Note:

- sequence 513 can be used where an automatic return is not programmed in the cycle and when the cycle has terminated. It can only be used through chaining.
- sequences 514 to 517 can only be executed when the shaft is in return position
- sequence 518 must not be executed if the index is already present otherwise the MVAT will output a fault. To avoid this, just test the presence of MVAT output S7 (shaft in home position) before starting this sequence.

384 standard resident press-fitting cycles are available in the MVAT.

Standard press-fitting cycle: "go to position x under controlled force N" or "push up to a force N and check position x" in 4 phases:

- **approach** at approach speed,
- **press-fit** at working speed,
- **slow down** to trip speed,
- **trip** then **return** to idle position or **chain**.

For standard cycles, a quality check is available at the end of the cycle for:

- the position reached,
- the peak force obtained,
- the residual force obtained,
- the difference in position between the position reached at the end of the cycle and that reached in the previous cycle or during a previous acquisition cycle.

100 resident curve acquisition programmes are available in the MVAT.

The first 16 of these curve acquisition programs allow 10 absolute position windows to be configured during which the force is stored by the MVAT.

The next 84 allow 5 recording ranges and 5 trapezoidal check windows to be placed absolutely or relatively.

The use of force/displacement curves allow a quality check to be carried out on the value of the force obtained x mm before the trip, and a more sophisticated check to be carried out on all the stored force values.

7.2 Operating modes

7.2.1 Mode with PLC

This mode is enabled through the field "PLC I/O Management" in the "Appendix" tab of the "Specifications" menu of RHAPSODIE. **Check** this box to enable this mode.

The "Step synchro" field must also be set to "YES".

This mode is governed by chronograms DIAG_ES1, DIAG_ES3 and DIAG_ES5. In this mode it is possible to select one of the 512 configurable sequences through the PLC or execute one of the 8 fixed sequences.

The 32 manual sequences described in chronogram DIAG_ES2 cannot be executed in this mode. On the other hand, the forced manual sequences described on the same chronogram can be executed.

7.2.2 Mode without PLC

This mode is enabled through the field "PLC I/O Management" in the "Appendix" tab of the "Specifications" menu of Rhapsodie.net. **Uncheck** this box to enable this mode.

In addition, MVAT input E7 must be set to 1, otherwise the forced manual sequences will be executed (see forced manual mode).

This mode is governed by chronogram DIAG_ES2. In this mode, it is possible to select (by addressing without multiplexing inputs) one of the first 32 programmed sequences by coding the inputs as described below:

	E6	E5	E4	E3	E2	E7		E6	E5	E4	E3	E2	E7
Sequence N° 1	0	0	0	0	0	1	Sequence N° 17	1	0	0	0	0	1
Sequence N° 2	0	0	0	0	1	1	Sequence N° 18	1	0	0	0	1	1
Sequence N° 3	0	0	0	1	0	1	Sequence N° 19	1	0	0	1	0	1
Sequence N° 4	0	0	0	1	1	1	Sequence N° 20	1	0	0	1	1	1
Sequence N° 5	0	0	1	0	0	1	Sequence N° 21	1	0	1	0	0	1
Sequence N° 6	0	0	1	0	1	1	Sequence N° 22	1	0	1	0	1	1
Sequence N° 7	0	0	1	1	0	1	Sequence N° 23	1	0	1	1	0	1
Sequence N° 8	0	1	1	1	1	1	Sequence N° 24	1	1	1	1	1	1
Sequence N° 9	0	1	0	0	0	1	Sequence N° 25	1	1	0	0	0	1
Sequence N° 10	0	1	0	0	1	1	Sequence N° 26	1	1	0	0	1	1
Sequence N° 11	0	1	0	1	0	1	Sequence N° 27	1	1	0	1	0	1
Sequence N° 12	0	1	0	1	1	1	Sequence N° 28	1	1	0	1	1	1
Sequence N° 13	0	1	1	0	0	1	Sequence N° 29	1	1	1	0	0	1
Sequence N° 14	0	1	1	0	1	1	Sequence N° 30	1	1	1	0	1	1
Sequence N° 15	0	1	1	1	0	1	Sequence N° 31	1	1	1	1	0	1
Sequence N° 16	0	1	1	1	1	1	Sequence N° 32	1	1	1	1	1	1

This mode is often used for a station without a PLC, the selection of the sequence to be executed being made by coding wheels for example.

7.2.3 Forced manual mode

This mode is available whatever field "PLC I/O Management" is set to.

On the other hand, MVAT input E7 must be set to 0.

By setting the inputs as described below (see also chronogram DIAG_ES2 on the bottom left), it is possible to execute pressing calibrations for the upper and lower gages, pulling calibration, and manual raising and lowering.

WARNING: This mode is not recommended for inexperienced users. When the station has a PLC, this must manage these movements through fixed selections.

	E2	E3	E4	E5	E6	E7
Lower gage pressing calibration	1	0	0	1	0	0
Upper gage pressing calibration	1	0	0	1	1	0
Pulling calibration	1	0	0	0	0	0
Pulling calibration	1	0	0	1	0	0
Manual return of shaft with force check	0	0	0	0	1	0
Manual exit of shaft with force check	0	0	0	1	1	0
Direct manual return of shaft with force check	0	0	1	0	0	0
Direct manual exit of shaft with force check	0	1	0	0	0	0
Direct manual return of shaft WITHOUT force check	0	0	1	1	0	0
Direct manual exit of shaft WITHOUT force check	0	1	0	1	0	0

7.3 Quality results

The quality result is given for each sequence and for each cycle in the sequence.

The quality result of the sequence is available on MVAT output S6 at the end of the sequence only.

The quality result of the cycle is available from the end of the cycle on MVAT output S6.

The quality result is built by logically "AND"ing the following checks:

- min position < position reached < max position
- min force < peak force (*or residual force*) < max force
- Min difference < position reached - initial position (*or previous position*) < Max difference
- Min/ force at the position before trip < Force before trip < Max force at the position before trip
- Curve check OK

Of course, these checks may be failed separately either by not entering a value in fields where a value is expected or by not requesting a check.

("Quality Validation" field of the curve submenu).

7.4 Page: "Curves"

This page is used to define the basic curve checking settings unlike the "Profiles" page which is used to program advanced curve checking.

This menu allows up to **10** windows to be configured using absolute values which trace the force as function of the displacement, and defines the type of check to carry out for all windows in order to validate the final quality of the press-fitting operation.

There is a maximum of **16** basic curve check programs.

For these checks to be carried out, it is essential that "Store the curve" has been selected for the cycle affected by the checks (see [Curve Storage field](#)), and that this cycle is associated with a curve program.

Force Storage Windows

	Start position	End position	
1	220,000	210,000	mm
2	200,000	180,000	mm
3	175,000	172,000	mm
4	0,000	0,000	mm
5	0,000	0,000	mm
6	0,000	0,000	mm
7	0,000	0,000	mm
8	0,000	0,000	mm
9	0,000	0,000	mm
10	0,000	0,000	mm

Created on: 04/06/2012 15:21:46 Modified on: 04/06/2012 15:24:25

Curve prog # 2001

Checked Curve Pressing

Control Type All

Quality validation ☒

1 Window / cycle ☐

Distance from end 0,500 mm

Max Force at Dist. from end 2 500,0 daN

Min Force at Dist. from end 2 000,0 daN

Gradient Threshold 0,0 daN

Flags 37

By: EXPERT

Comments :

Controls

Max Values				Min Values			
Gradient	Factor	Mode / Delta	Delta Type	Max. Force	Min. Force	Max. Force	Min. Force
1	1	0,000	2	2 600,0	2 400,0	2 400,0	2 200,0
2	2	0,000	2	2 200,0	2 000,0	2 000,0	1 800,0
3	3	0,000	2	1 800,0	1 600,0	1 500,0	1 000,0
4	4	0,000	0	0,0	0,0	0,0	0,0
5	5	0,000	0	0,0	0,0	0,0	0,0
6	6	0,000	0	0,0	0,0	0,0	0,0
7	7	0,000	0	0,0	0,0	0,0	0,0
8	8	0,000	0	0,0	0,0	0,0	0,0
9	9	0,000	0	0,0	0,0	0,0	0,0
10	10	0,000	0	0,0	0,0	0,0	0,0

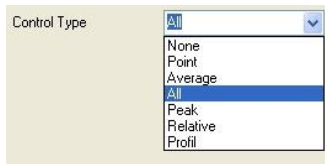
Ethernet connected FSA - GDF Suez User : EXPERT

COMMENTS AREA:

Free format comment field (limited to 4096 characters)

DEFINITION OF ENTRY FIELDS

Control type: allows the user to select **6 types** of check for all defined windows



Fields identical for all types of check:

Checked curve: This field allows the user to select which curves the check is to be carried out on, in pressing or pulling mode (checking both is disabled).



The MVAT currently stores 2048 pressing force values and 2048 pulling force values.

Quality validation: If this box is checked, the quality check carried out on each of the storage windows enters in the overall quality assessment of the press-fitting operation. For example, if a press-fitting operation reaches the desired end under the desired final force, but the check carried out on window no.3 proved to be not OK, the press-fitting cycle is declared not OK. If this box was not checked, the quality check of each window does not form part of the overall press-fit quality.

1 Window/cycle: If this box is checked, on each cycle or each sequence chained and if curve storage was requested in the cycle, the storage window taken into account will be the next window.

If this box is not checked, the window is no longer associated with the cycle and it is possible to have several windows in the same cycle.

The curve result is valid at the end of the sequence (the curve check is carried out once the pin returns to idle position)

- If the 1 Window/cycle box is checked, the curve result is valid over the last cycle which precedes the return if this is carried out using soft chaining.

- If the 1 Window/cycle box is not checked, the curve result is valid at the end of the cycle when all programmed windows have been executed.

In the other cases, the curve result is valid at the end of the sequence.

Since V10 MVAT version, if you want to use a Curve program with « Force From End », you have to use the fields in the Cycle.

The fields in Curve program are not used anymore.

Distance from End: during a press fit cycle, if you want to know the force measured at a given distance from the final position, just enter the value of this distance in this field. The force measured at the position equal to this distance will be given in the result block with the associated quality check. The default value 0 disables this feature.

Depending on the selection made in the cycle program, the "Force before end" will be available for each pressing cycle or only for the last in the sequence, and the quality validation of the sequence will include or not include all the "Force before end" checks. The result block is slightly different (see [Executing a sequence](#))

Max. Force at Dist from end: If the force measured at the position before the end is greater than this value, the cycle is declared not OK.

If no value is entered, the quality check on this max. force is disabled.

Min. Force at Dist from end: If the force measured at the position before the end is less than this value, the cycle is declared not OK.

If no value is entered, the quality check on this min. force is disabled.

Force storage windows: These fields are used to define the start and end positions of each storage window. For each window where the start and end position values are non-zero, the MVAT will store the force values observed between the two positions. The force sampling step depends on the number of windows desired and the width of each sampling step.

On the screen shown as an example:

$$\text{Pas d'échant.} = \frac{(\text{cote déb.} - \text{cote fin})^{\text{fenêtre1}} + (\text{cote déb.} - \text{cote fin})^{\text{fenêtre2}} + \dots + (\text{cote déb.} - \text{cote fin})^{\text{fenêtre10}}}{2048}$$

WARNING: Where several cycles are chained (for example 1 calls 3 and 3 calls 10), the 2048 storage points will be distributed over all the check window for the cycles for which curve storage has been requested. Example:

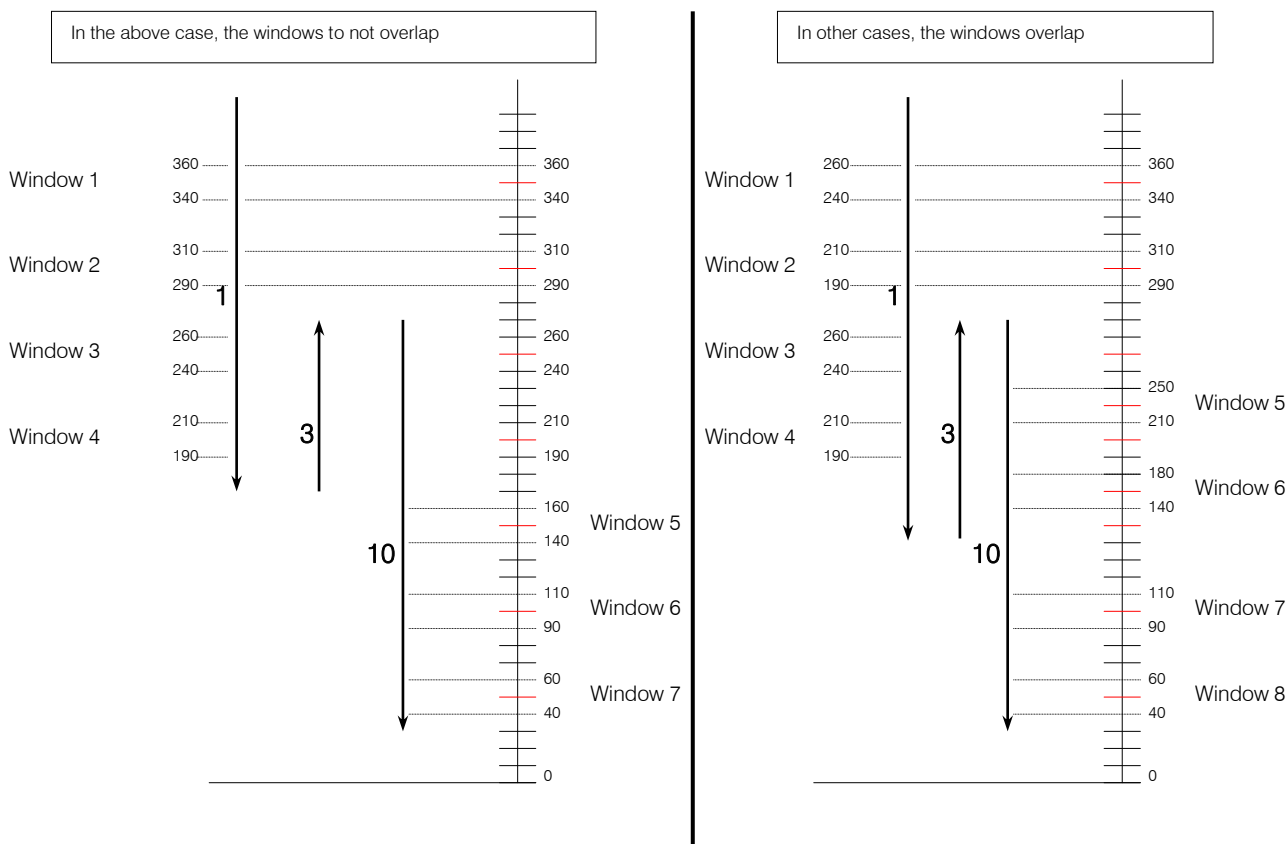
Sequence number	Cycle number	Curve number
6	1	3

Cycle 1	Storage YES	Cycle 3	Storage NO	Cycle 10	Storage NO
---------	-------------	---------	------------	----------	------------

Curve 3	
	Window 1: 360-340
	Window 2: 310-290
	Window 3: 260-240
	Window 4: 210-190
	Window 5: 160-140
	Window 6: 110-90
	Window 7: 060-040

$$\text{Pas} = \frac{(360 - 340) + (310 - 290) + (260 - 240) + (210 - 190) + (160 - 140) + (110 - 90) + (60 - 40)}{2048} = \frac{140}{2048} = 0,068 \text{ mm}$$

Illustration:



Fields which vary according by type of check:

CONTROL TYPE: NONE:

The screenshot shows the 'Force Storage Windows' configuration window. The 'Control Type' is set to 'None'. The 'Quality validation' checkbox is checked. The 'Checked Curve' is 'Pressing'. The 'Distance from end' is 0,500 mm. The 'Max Force at Dist. from end' is 2 500,0 daN. The 'Min Force at Dist. from end' is 2 000,0 daN. The 'Gradient Threshold' is 0,0 daN. The 'Flags' are set to 5. The 'Curve prog #' is 2001. The 'Comments' field is empty. The 'By' field is 'EXPERT'. The 'Max Values' and 'Min Values' tables are visible, showing force values for 10 points.

Point	Start position	End position	mm	Max Force	Min Force	daN
1	220,000	210,000	mm	2 600,0	2 400,0	daN
2	200,000	180,000	mm	2 200,0	2 000,0	daN
3	175,000	172,000	mm	1 800,0	1 600,0	daN
4	0,000	0,000	mm	0,0	0,0	daN
5	0,000	0,000	mm	0,0	0,0	daN
6	0,000	0,000	mm	0,0	0,0	daN
7	0,000	0,000	mm	0,0	0,0	daN
8	0,000	0,000	mm	0,0	0,0	daN
9	0,000	0,000	mm	0,0	0,0	daN
10	0,000	0,000	mm	0,0	0,0	daN

No check, the curve is merely drawn

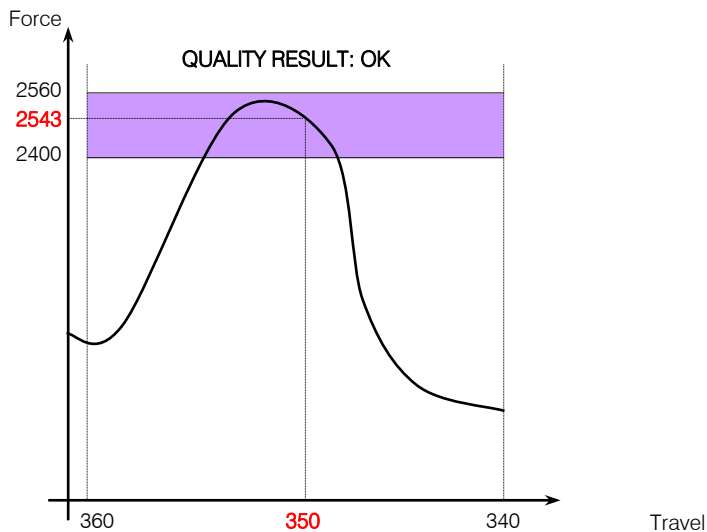
Quality validation: This field may not be accessed in this mode.

CONTROL TYPE: POINT:

The screenshot shows the 'Force Storage Windows' configuration window. The 'Control Type' is set to 'Point'. The 'Quality validation' checkbox is checked. The 'Checked Curve' is 'Pressing'. The 'Distance from end' is 0,500 mm. The 'Max Force at Dist. from end' is 2 500,0 daN. The 'Min Force at Dist. from end' is 2 000,0 daN. The 'Gradient Threshold' is 0,0 daN. The 'Flags' are set to 13. The 'Curve prog #' is 2001. The 'Comments' field is empty. The 'By' field is 'EXPERT'. The 'Max Values' and 'Min Values' tables are visible, showing force values for 10 points. A red circle highlights the 'Displacement' column in the 'Max Values' table.

Point	Start position	End position	mm	Max Force	Min Force	daN
1	220,000	210,000	mm	2 600,0	2 400,0	daN
2	200,000	180,000	mm	2 200,0	2 000,0	daN
3	175,000	172,000	mm	1 800,0	1 600,0	daN
4	0,000	0,000	mm	0,0	0,0	daN
5	0,000	0,000	mm	0,0	0,0	daN
6	0,000	0,000	mm	0,0	0,0	daN
7	0,000	0,000	mm	0,0	0,0	daN
8	0,000	0,000	mm	0,0	0,0	daN
9	0,000	0,000	mm	0,0	0,0	daN
10	0,000	0,000	mm	0,0	0,0	daN

A check is carried out here that for a position value contained in the window (field "Displacement"), the force is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).



CONTROL TYPE: AVERAGE:

Rhapsodie.Net [My_Project] - [My_Station] - [Curve of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

Page Liste

Force Storage Windows Created on: 04/06/2012 15:21:45 Modified on: 04/06/2012 15:32:26 Curve prog # 2001

Start position	End position	mm
1 220,000	210,000	mm
2 200,000	180,000	mm
3 175,000	172,000	mm
4 0,000	0,000	mm
5 0,000	0,000	mm
6 0,000	0,000	mm
7 0,000	0,000	mm
8 0,000	0,000	mm
9 0,000	0,000	mm
10 0,000	0,000	mm

Comments :

By: EXPERT

Checked Curve Pressing

Control Type Average

Quality validation ☒

1 Window / cycle ☐

Distance from end 0,500 mm

Max Force at Dist. from end 2 500,0 daN

Min Force at Dist. from end 2 000,0 daN

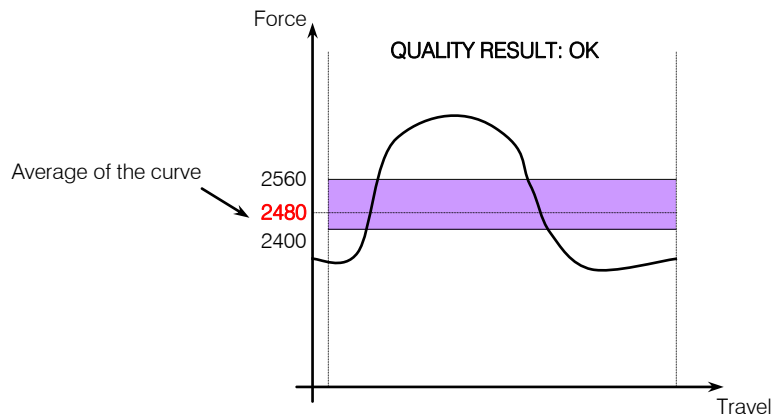
Gradient Threshold 0,0 daN

Flags 21

Max Values			Controls		Min Values	
	Max. Force	Min. Force			Max. Force	Min. Force
1	2 600,0	2 400,0	1	daN	2 400,0	2 200,0
2	2 200,0	2 000,0	2	daN	2 000,0	1 800,0
3	1 800,0	1 600,0	3	daN	1 500,0	1 000,0
4	0,0	0,0	4	daN	0,0	0,0
5	0,0	0,0	5	daN	0,0	0,0
6	0,0	0,0	6	daN	0,0	0,0
7	0,0	0,0	7	daN	0,0	0,0
8	0,0	0,0	8	daN	0,0	0,0
9	0,0	0,0	9	daN	0,0	0,0
10	0,0	0,0	10	daN	0,0	0,0

Ethernet connected FSA - GDF Suez User : EXPERT

A check is carried out here that the average force is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).



CONTROL TYPE: ALL: (without gradient mode)

Rhapsodie.Net | [My_Project] - [My_Station] - [Curve of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

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Page Liste

Force Storage Windows Created on: 04/06/2012 15:21:46 Modified on: 04/06/2012 15:33:39

Start position	End position	mm
1 220,000	210,000	mm
2 200,000	180,000	mm
3 175,000	172,000	mm
4 0,000	0,000	mm
5 0,000	0,000	mm
6 0,000	0,000	mm
7 0,000	0,000	mm
8 0,000	0,000	mm
9 0,000	0,000	mm
10 0,000	0,000	mm

Comments :

By: EXPERT

Curve prog # 2001

Checked Curve Pressing

Control Type ALL

Quality validation ☒

1 Window / cycle ☐

Distance from end 0,500 mm

Max Force at Dist. from end 2 500,0 daN

Min Force at Dist. from end 2 000,0 daN

Gradient Treshold 0,0 daN

Flags 37

Gradient	Factor	Mode / Delta	Delta Type	Max Values		Min Values	
				Max. Force	Min. Force	Max. Force	Min. Force
1	1	0,000	1 2	2 600,0	2 400,0	1 2 400,0	2 200,0
2	2	0,000	2 2	2 200,0	2 000,0	2 2 000,0	1 000,0
3	3	0,000	3 2	1 800,0	1 600,0	3 1 500,0	1 000,0
4	4	0,000	4 0	0,0	0,0	4 0,0	0,0
5	5	0,000	5 0	0,0	0,0	5 0,0	0,0
6	6	0,000	6 0	0,0	0,0	6 0,0	0,0
7	7	0,000	7 0	0,0	0,0	7 0,0	0,0
8	8	0,000	8 0	0,0	0,0	8 0,0	0,0
9	9	0,000	9 0	0,0	0,0	9 0,0	0,0
10	10	0,000	10 0	0,0	0,0	10 0,0	0,0

Ethernet connected FSA - GDF Suez User : EXPERT

A check is carried out here that the maximum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).

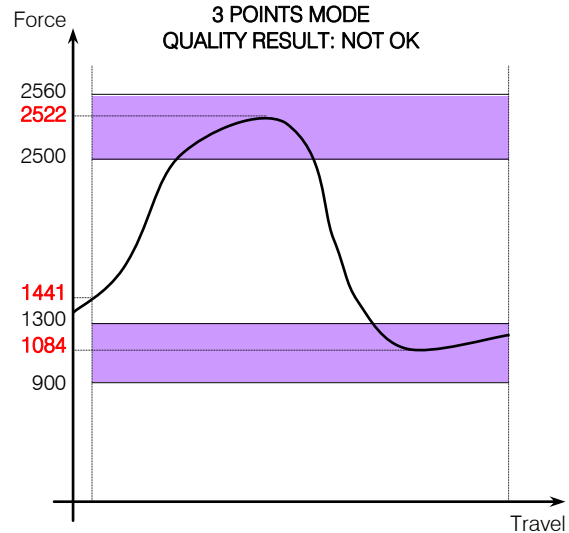
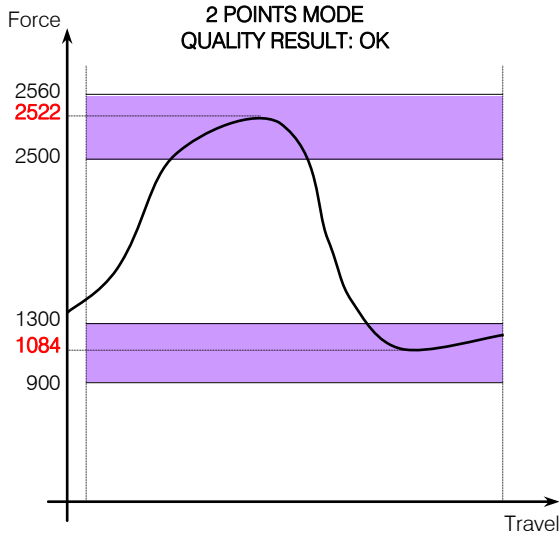
A check is also made that the minimum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Min values" (units: daN).

For this type of check, there are also 2 modes: "2 points" or "3 points".

Enter 2 or 3 in the "Mode/delta" field

In 2-points mode, the maximum and minimum of the curve are taken into account.

In 3-points mode, the maximum of the curve and the 2 minimums are taken into account (that BEFORE the maximum and that AFTER).



CONTROL TYPE: PEAK:

Rhapsodie.Net [My_Project] - [My_Station] - [Curve of O-ring_Press-fit_Unit]

Project Pages Windows Tools Edit Display Help

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Force Storage Windows Created on: 04/06/2012 15:21:45 Modified on: 04/06/2012 15:34:34

Start position	End position	mm
1	220,000	210,000
2	200,000	180,000
3	175,000	172,000
4	0,000	0,000
5	0,000	0,000
6	0,000	0,000
7	0,000	0,000
8	0,000	0,000
9	0,000	0,000
10	0,000	0,000

Comments :

By : EXPERT

Curve prog # 2001

Checked Curve Pressing

Control Type Peak

Quality validation ☒

1 Window / cycle ☐

Distance from end 0,500 mm

Max Force at Dist. from end 2 500,0 daN

Min Force at Dist. from end 2 000,0 daN

Gradient Treshold 0,0 daN

Flags 69

Controls

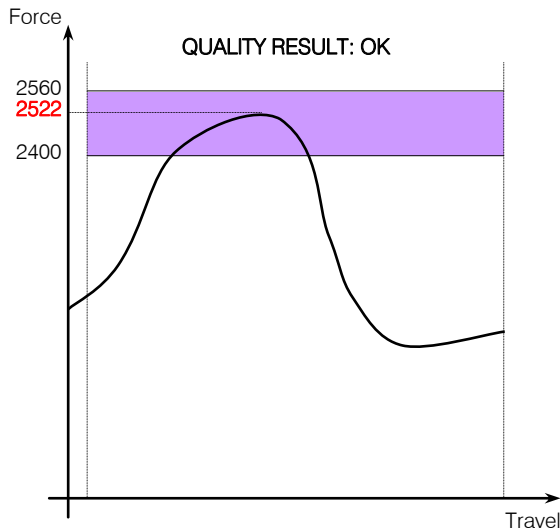
Max Values		Min Values	
Max. Force	Min. Force	Max. Force	Min. Force
1	2 600,0	2 400,0	2 200,0
2	2 200,0	2 000,0	1 800,0
3	1 800,0	1 600,0	1 400,0
4	0,0	0,0	0,0
5	0,0	0,0	0,0
6	0,0	0,0	0,0
7	0,0	0,0	0,0
8	0,0	0,0	0,0
9	0,0	0,0	0,0
10	0,0	0,0	0,0

Mode / Delta

Mode	Delta
1	2
2	2
3	2
4	0
5	0
6	0
7	0
8	0
9	0
10	0

Ethernet connected FSA - GDF Suez User : EXPERT

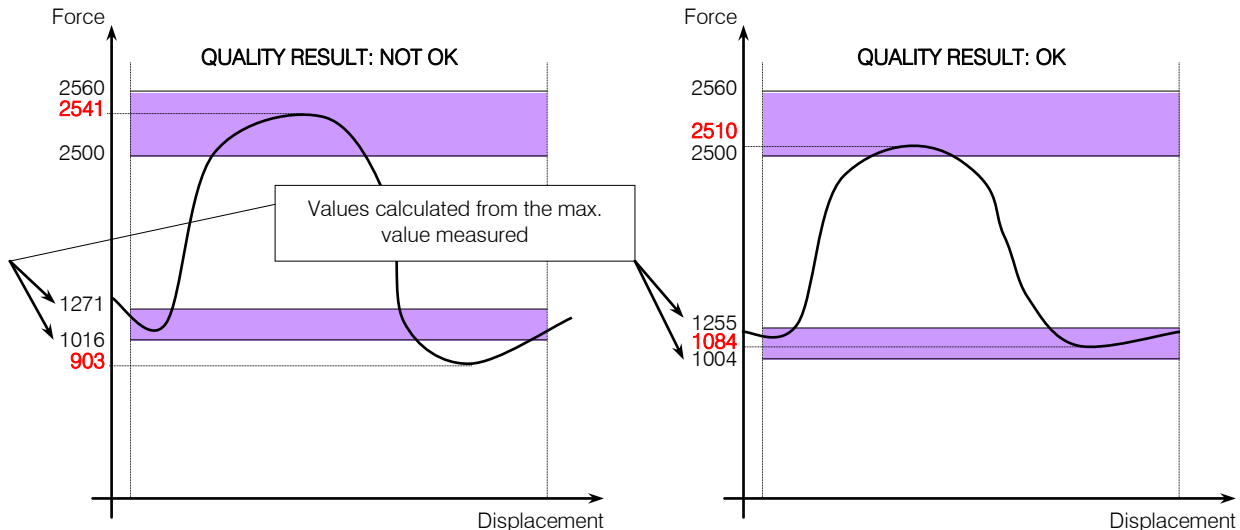
The only check carried out here is that the maximum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).



CONTROL TYPE: RELATIVE: (without gradient mode)

A check is carried out here that the maximum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).

A check is also made that the minimum of the curve for each window is within a range whose max. and min. values are calculated from the maximum value of the curve. 2 values as a percentage are entered in the "Max force" and "Min force" fields of the "Min values" column (unit: %).



For this type of check, there are 2 modes in addition: "2 points" or "3 points".

In 2 points mode, in the same way as the example above we take the maximum of the curve to check the maximum value and the minimum of the curve to check the minimum value.

In 3 points mode, we take the maximum of the curve to check the maximum value and 2 minimums of the curve to check the minimum value.

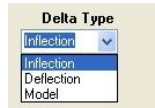
We check that the minimum of the curve situated BEFORE its maximum and the minimum situated AFTER its maximum are between the maximum force and minimum force calculated.

Control type: with Activation of GRADIENT mode

Gradient: checks changes in the slope of the curve.

See: [Appendix 8 – GRADIENT FUNCTION](#)

When the gradient function is enabled, a delta type field is available.



Allows the orientation of the curve on input to the window to be specified either as **Inflection**, **Deflection** or **Model** (not enabled, reserved for profile application).

CONTROL TYPE: ALL: (With gradient mode)

- Check "**Gradient**" to check changes in the slope(s) of the window(s) to be monitored.
- Enter the "**Gradient threshold**" value (with the help of Fabricom's Solution3d.xls tool)
- Enter the "**Factor**" and "**Delta**" values for each window where the gradient check box is checked, the field for the corresponding "factor" value having become active.

Force Storage Windows

Start position	End position	mm
1	220,000	210,000
2	200,000	180,000
3	175,000	172,000
4	0,000	0,000
5	0,000	0,000
6	0,000	0,000
7	0,000	0,000
8	0,000	0,000
9	0,000	0,000
10	0,000	0,000

Created on: 04/06/2012 15:21:46 Modified on: 04/06/2012 15:47:43

Curve prog # 2001

Checked Curve Pressing

Control Type All

Quality validation ☒

1 Window / cycle ☐

Distance from end 0,500 mm

Max Force at Dist. from end 2 500,0 daN

Min Force at Dist. from end 2 000,0 daN

Gradient Treshold 1 000,0 daN

Flags 131109

By: EXPERT

Gradient	Factor	Mode / Delta	Delta Type	Max. Force	Min. Force	daN	Max. Force	Min. Force	daN
1	1	0,000	1	2 600,0	2 400,0	daN	1	2 400,0	2 200,0
2	2	100,000	2	2 200,0	2 000,0	daN	2	2 000,0	1 800,0
3	3	0,000	3	1 800,0	1 600,0	daN	3	1 500,0	1 000,0
4	4	0,000	4	0,0	0,0	daN	4	0,0	0,0
5	5	0,000	5	0,0	0,0	daN	5	0,0	0,0
6	6	0,000	6	0,0	0,0	daN	6	0,0	0,0
7	7	0,000	7	0,0	0,0	daN	7	0,0	0,0
8	8	0,000	8	0,0	0,0	daN	8	0,0	0,0
9	9	0,000	9	0,0	0,0	daN	9	0,0	0,0
10	10	0,000	10	0,0	0,0	daN	10	0,0	0,0

Ethernet connected FSA - GDF Suez User : EXPERT

- In a window with gradient checking, as the entry of the "mode" is hidden by the "Delta", the force control settings are forced to "2 points" mode automatically. If one or more of the max or min values are not wanted, just set them to zero.

- It is essential to use the Fabricom Solution3d.xls assistance tool which uses the curves from VisuCourbe and enables suitable settings to be defined from actual readings.

CONTROL TYPE: RELATIVE: (With gradient mode)

- Check "Gradient" to check changes in the slope(s) of the window(s) to be monitored.
- Enter the "Gradient threshold" value (with the help of Fabricom's Solution3d.xls tool)
- Enter the "**Factor**" and "**Delta**" values for each window where the gradient check is checked, the field for the corresponding "factor" value having become active.

Force Storage Windows

Created on: 04/06/2012 15:21:46 Modified on: 04/06/2012 15:51:53

Curve prog # 2001

Checked Curve Pressing

Control Type Relative

Quality validation ☒

1 Window / cycle ☐

Distance from end 0,500 mm

Max Force at Dist. from end 2 500,0 daN

Min Force at Dist. from end 2 000,0 daN

Gradient Threshold 1 000,0 daN

Flags 131205

By: EXPERT

Gradient	Factor	Mode / Delta	Delta Type	Max Values		Min Values					
				Max. Force	Min. Force	Max. Force	Min. Force				
☐	1	0,000	1	2	2 600,0	2 400,0	daN	1	0,0	0,0	%
☒	2	100,000	2	16	2 200,0	2 000,0	daN	2	50,0	40,0	%
☐	3	0,000	3	2	1 800,0	1 600,0	daN	3	0,0	0,0	%
☐	4	0,000	4	0	0,0	0,0	daN	4	0,0	0,0	%
☐	5	0,000	5	0	0,0	0,0	daN	5	0,0	0,0	%
☐	6	0,000	6	0	0,0	0,0	daN	6	0,0	0,0	%
☐	7	0,000	7	0	0,0	0,0	daN	7	0,0	0,0	%
☐	8	0,000	8	0	0,0	0,0	daN	8	0,0	0,0	%
☐	9	0,000	9	0	0,0	0,0	daN	9	0,0	0,0	%
☐	10	0,000	10	0	0,0	0,0	daN	10	0,0	0,0	%

Ethernet connected FSA - GDF Suez User : EXPERT

- In a window with gradient checking, as the entry of the "mode" is hidden by the "Delta", the force control settings are forced to "2 points" mode automatically. If one or more of the max or min values are not wanted, just set them to zero.

- It is essential to use the Fabricom Solution3d.xls assistance tool which uses the curves from VisuCourbe and enables suitable settings to be defined from actual readings.

CONTROL TYPE: PROFILE:

Profile: modelling the curve and checking it by envelope. (Reserved for a future application)

7.5 Access level

Rhapsodie.net has 4 access levels: Creator, expert, operator and visitor
Each restricts each function and each page in a different way



For each page, the figure indicates the minimum level necessary to modify the page

The possible box colours are as follows:

red if you do not have sufficient rights or

green if you have sufficient rights.

The tables below show the minimum level you must have to be able to modify pages and access functions

Page	Level	No.
Stations	Creator	4
Press-fitting units	Creator	4
Specifications	Expert	3
Cycles	Operator	2
Line Chart	Operator	2
Sequences	Expert	3
Results	Creator	4
Press-fit unit references	Creator	4

Functions	Level	No.
Send config	Expert	3
Global send	Expert	3
Partial send	Operator	2
Upload	Expert	3
Import	Creator	4
Export	Creator	4
Backup compilation	Operator	2

Access control



If you try to modify a station which is already open but for which you do not have rights, you will not be able to save any changes made

7.6 TRACEABILITY OF SETTINGS

Each page has its own traceability.

All actions are traced and recorded by the software under the name of the person who opened the session.

Station, UE, sequence, result and UE reference pages:

Modification date: Date of last modification carried out on the UE in question.

Creation date: Date of last modification carried out on the UE in question.

Signature: Name of the person who carried out the last modifications.

Specification, cycle, curve pages:

Modification: Date of last modifications carried out for the current page.

Creation: Date the current page was created.

Signed: Name of the person who carried out the last modification.

8 Execution Journal

The journal is a window in the "Vissage" communication software. Everything which appears in this window is stored in a file in the "journal" directory itself situated in the directory for the press-fitting unit.

Each time Rhapsodie.net is started, a new file is created with a name made up as follows:
"journal_Dddmmyyyhhmmss" (journal_D+date+time).

This directory must be regularly cleared so as not to saturate the disk on the PC.

8.1 Execution of a calibration on the lower gage

Calibration in progress

Station/Channel/Addr: 000.000.001.237.173.008.001

D/M/Y , H/M/S : 28/03/2000 08/03/00,61

Total seq. time : 20.74 s

Pin. temp.: 22.73 Deg.

Frame temp.: 22.77 Deg.

Module temp.: 37.05 Deg.

Sequence number: 10039

Sequence NOT OK

Lower gage pressing calibration

Calibration Force: 2811.1 daN

Resolution depl. : 1212.050 I/mm

Press Opening : 275.033 mm

Index centring: 5.267 mm

Initial Offset : 9.14 %

Final Offset : -0.04 %

Combination of the chassis identification and the channel number

Only if external temperature sensor connected.

1 = i/o not coded
39 = decimal of binary number given by inputs E0 to E7

Not OK as calibration not terminated

Force obtained during calibration

8.2 Execution of a calibration on the upper gage

Calibration terminated

Station/Channel/Addr: 000.000.001.237.173.008.001

D/M/Y , H/M/S : 28/03/2000 08/05/2003,22

Total seq. time : 20.74 s

Pin. temp.: 23.03 Deg.

Frame temp.: 22.99 Deg.

Module temp.: 37.05 Deg.

Sequence number: 10103

Sequence OK.

Upper gage pressing calibration

Calibration Force: 2805.9 daN

Resolution depl. : 512.050 I/mm

Press Opening : 275.033 mm

Index centring: 5.267 mm

Initial Offset : 9.14 %

Final Offset : -0.04 %

Calibration took place correctly and the new resolution, opening and centring values of the pulses have been saved by the MVAT

This "Calibration results" block only gives the correct values for the resolution, press opening and index centring at the end of upper gage calibration after lower gage calibration has been carried out. The 3 values "Resolution depl.", "Press Opening" and "Index centring" must be copied into Rhapsodie.net in the respective fields "Number of pulses/mm", "Top Dead Centre" and "Index Centring" of the setpoint tab of the specifications page.

8.3 Execution of a sequence

Example 1: Sequence made up of a single cycle, without chaining, without curve checking, no force before end - Execution correct and quality OK

```
*****
Station/Channel/Addr: 000.000.001.237.173.008.001
D/M/Y , H/M/S      : 29/03/2000 20/01/1949,79
Total seq. time    : 7.26 s
Pin. temp.:        23.03 Deg.
Frame temp.:       22.99 Deg.
Module temp.:      37.05 Deg.
Sequence number:   1
Sequence OK
Result number:     318
Curve number      : 2
Cycle number      : 1
-----
Cycle number      : 1
Sheet number      : 1
Press-fitting pressing cycle OK
Cycle Time:       6.41 s
Previous position : 12.461 mm
Position reached  : 12.442 mm OK
Peak Force        : 2561.3 daN
Residual Force    : 2542.1 daN OK
Position difference: -0.019 mm OK
-----
```

The date is that sent by the PC

Quality result on the entire sequence

Order number of cycle within sequence

No. of cycle executed

Quality result: TB = too big
for the cycle TS = too small
OK = good

Example 2: Sequence made up of a single cycle, without chaining, with curve checking, and force before end - Execution incorrect

```
*****
Station/Channel/Addr: 000.000.001.237.173.008.001
D/M/Y , H/M/S      : 29/03/2000 20/01/1949,79
Fault number:       6
Total seq. time    : 7.26 s
Pin. temp.:        23.03 Deg.
Frame temp.:       22.99 Deg.
Module temp.:      37.05 Deg.
Sequence number:   1
Curve check enabled NOT OK
Sequence NOT OK
Result number:     318
Curve number      : 2
Cycle number      : 1
Av. force Peak    :567.0 daN OK
-----
Cycle number      : 1
Sheet number      : 1
Acquisition pressing cycle NOT OK
Cycle Time:       6.41 s
Previous position : 12.461 mm
Position reached: 15.442 mm TB
Peak Force        : 2561.3 daN
Residual Force    :2542.1 daN OK
Position difference: -3.019 mm TB
```

A fault number was output. Refer to appendix 5 to find the title of the error

Quality validation by curve checking was requested

No. of curve acquisition program

Force read at the position before end (see "Curve" page) on condition that storage of the curve was requested in the cycle

Example 3: Sequence made up of 3 chained cycles, without curve checking, and with force before end of each cycle - Execution correct

Station/Channel/Addr: 000.000.001.237.173.008.001

D/M/Y , H/M/S : 29/03/2000 20/01/1949,79

Total seq. time : 7.26 s

Pin. temp.: 23.03 Deg.

Frame temp.: 22.99 Deg.

Module temp.: 37.05 Deg.

Sequence number: 1

Sequence OK.

Result number: 321

Curve number : 2

Cycle number : 3

Number of chained cycles

Cycle number : 1

Sheet number : 1

Press-fitting pressing cycle OK

Cycle Time: 6.41 s

Previous position : 12.461 mm

Position reached: 15.442 mm OK

Peak Force : 2561.3 daN

Residual Force : 2542.1 daN OK

Position difference: -3.019 mm OK

Av. force Peak : 567.0 daN OK

The force before end is no longer global to the sequence but given for each pressing cycle

Cycle number : 2

Sheet number : 134

Press-fitting pulling cycle OK

Cycle Time: 6.41 s

Previous position : 15.442 mm

Position reached: 120.012 mm OK

Peak Force : 1.3 daN

Residual Force : 0.2 daN OK

Position difference: -104.570 mm OK

Cycle number : 3

Sheet number : 22

Press-fitting pressing cycle OK

Cycle Time: 6.41 s

Previous position : 120.012 mm

Position reached: 15.398 mm OK

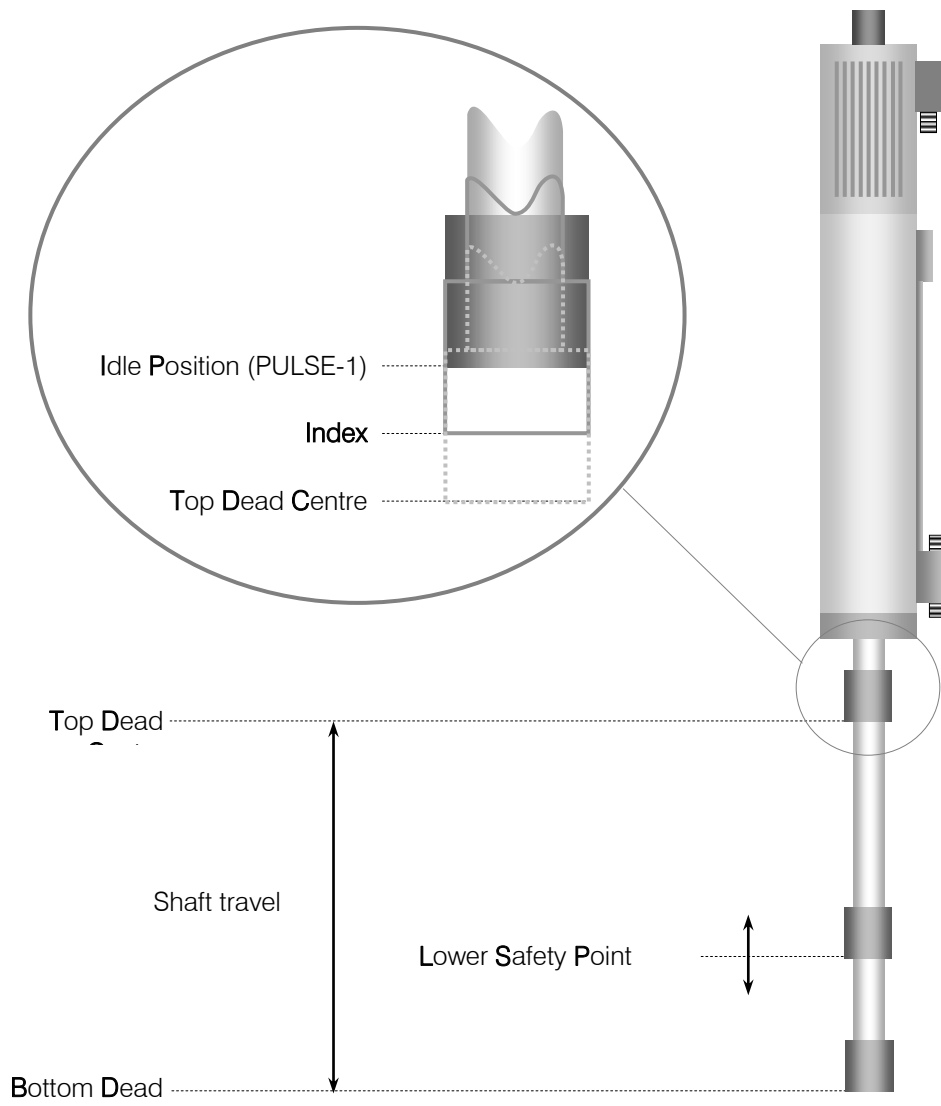
Peak Force : 2540.3 daN

Residual Force : 2521.5 daN OK

Position difference: 104.614 mm OK

Av. force Peak : 581.0 daN OK

9 Appendix



9.1 Glossary

Idle Position Default position of the shaft at the start of each cycle. This position is only active after an initial cycle each time the equipment is switched on. This position may be configured between the Index (position given by the MVAT after calibration under the title "Index centring") and the position of PULSE-1. See "Specifications" However, it is recommended to operate with the field "Idle position from TDC" set to 0.

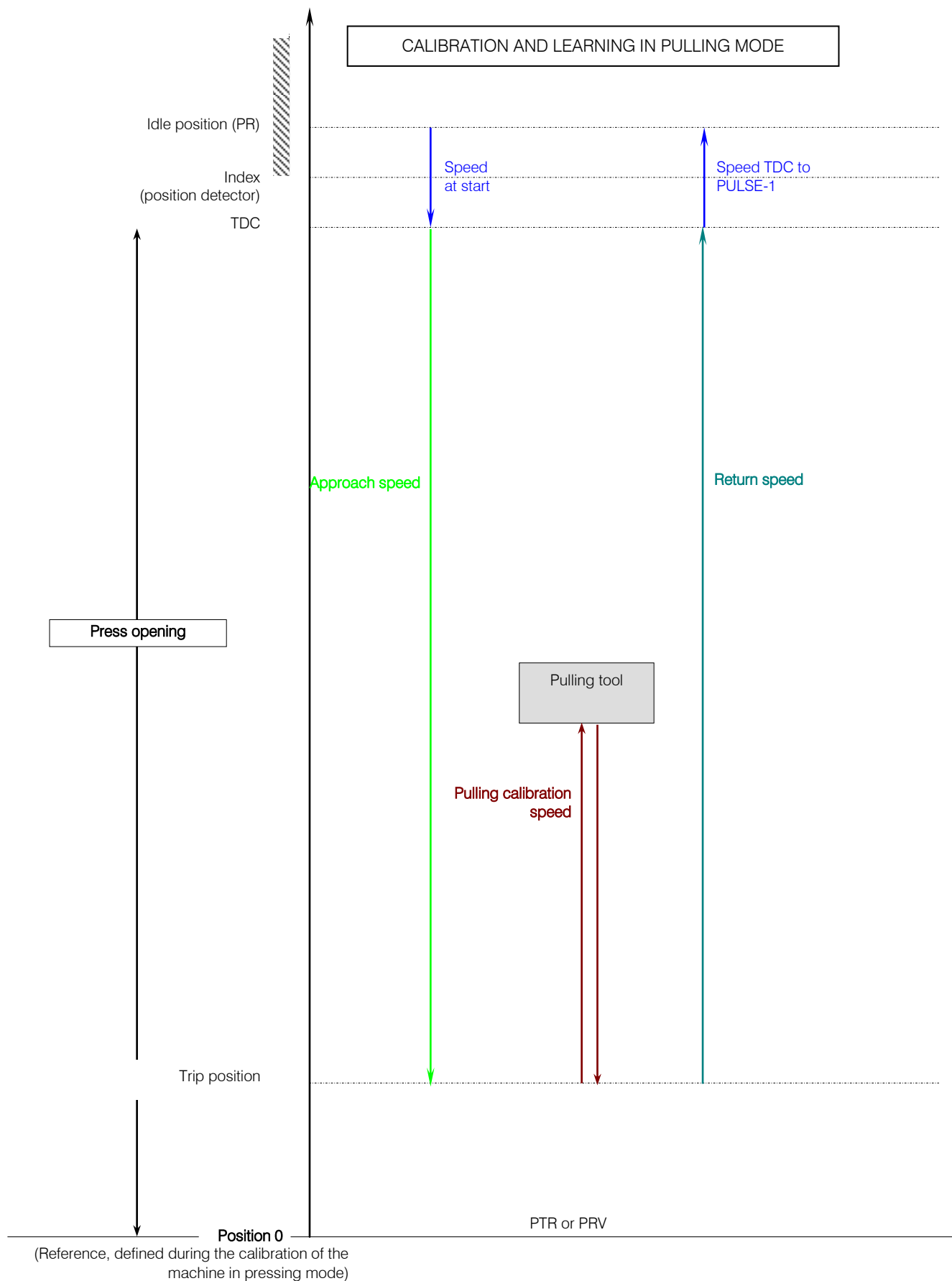
Index: The position of PULSE 0 and PULSE-1 must be either side of the position of the Index and at an equal distance for safe operation (i.e. "Index centring" equal to half of the screw pitch). This is the return position of the shaft until the pin has been initialised (by an initial cycle after power on).

Top Dead Centre: This is the effective starting point of displacement measurements.

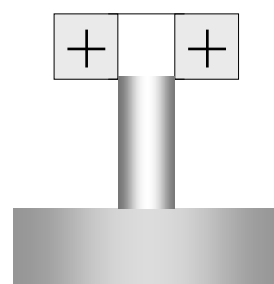
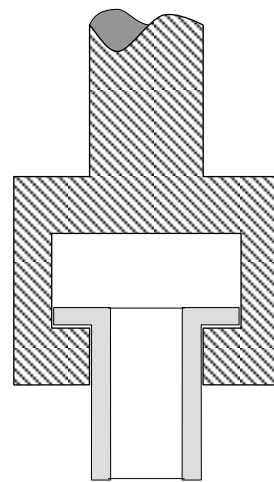
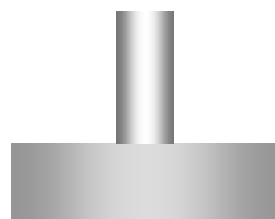
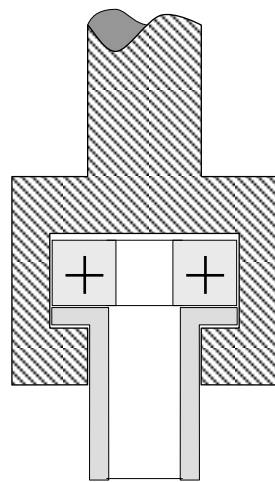
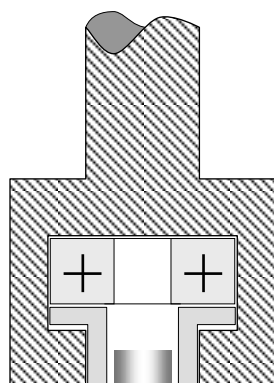
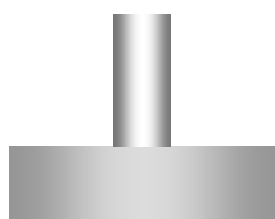
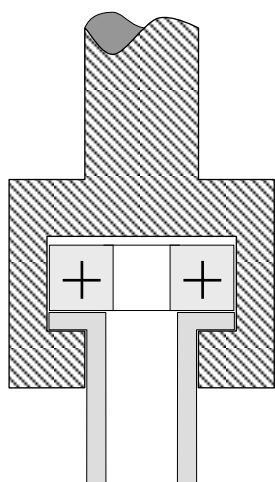
Bottom Dead Centre: This is the maximum physical position the shaft can reach when it is fully extended.

Lower Safety Point: This is a limitation on this position obtained by programming in order to avoid damaging the pin

9.2 Position and speed diagram



9.3 Acquisition and Press-fitting: example:

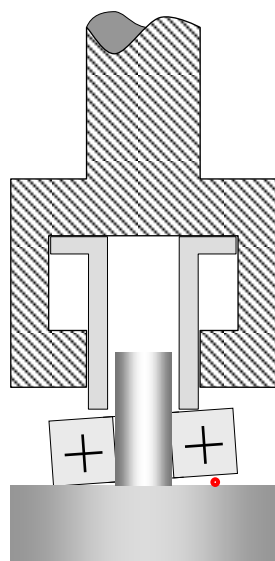
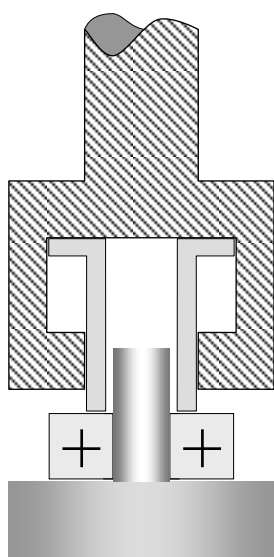
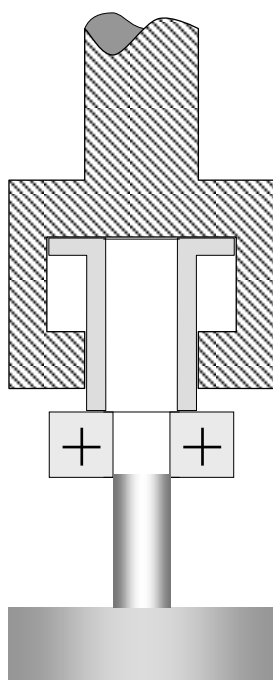


1: Acquisition cycle with end part in the stack

2: The initial position is probed

3: Return to idle position

4: part ready to be press-fitted



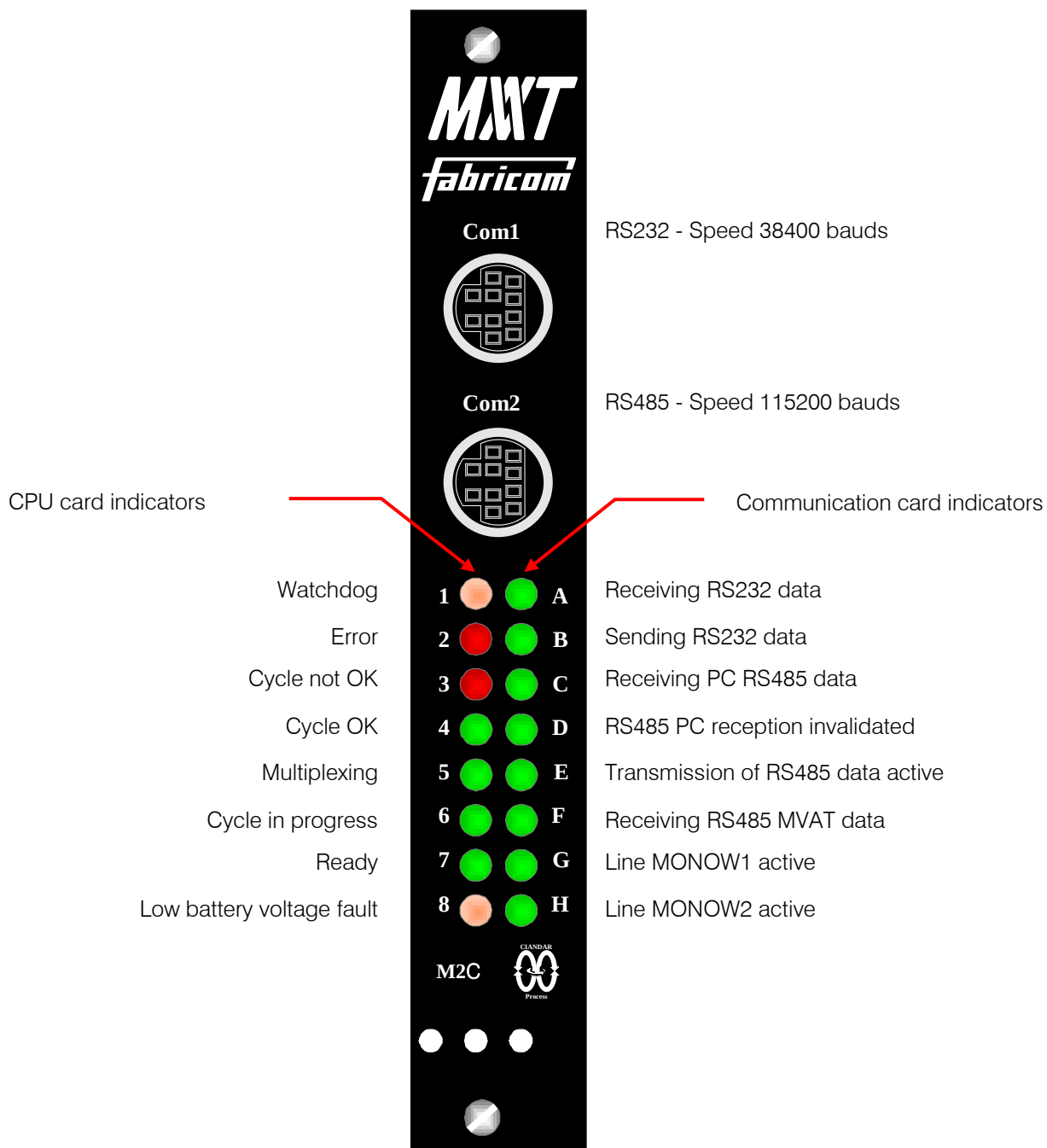
5: Start of press-fitting

6: Press fitting finished Max Diff. < final position - initial position < Min. Diff.

6a: Press fitting finished Final position > initial position

9.4 Meaning of indicators on front panel

MVAT card



MVAT NET card:

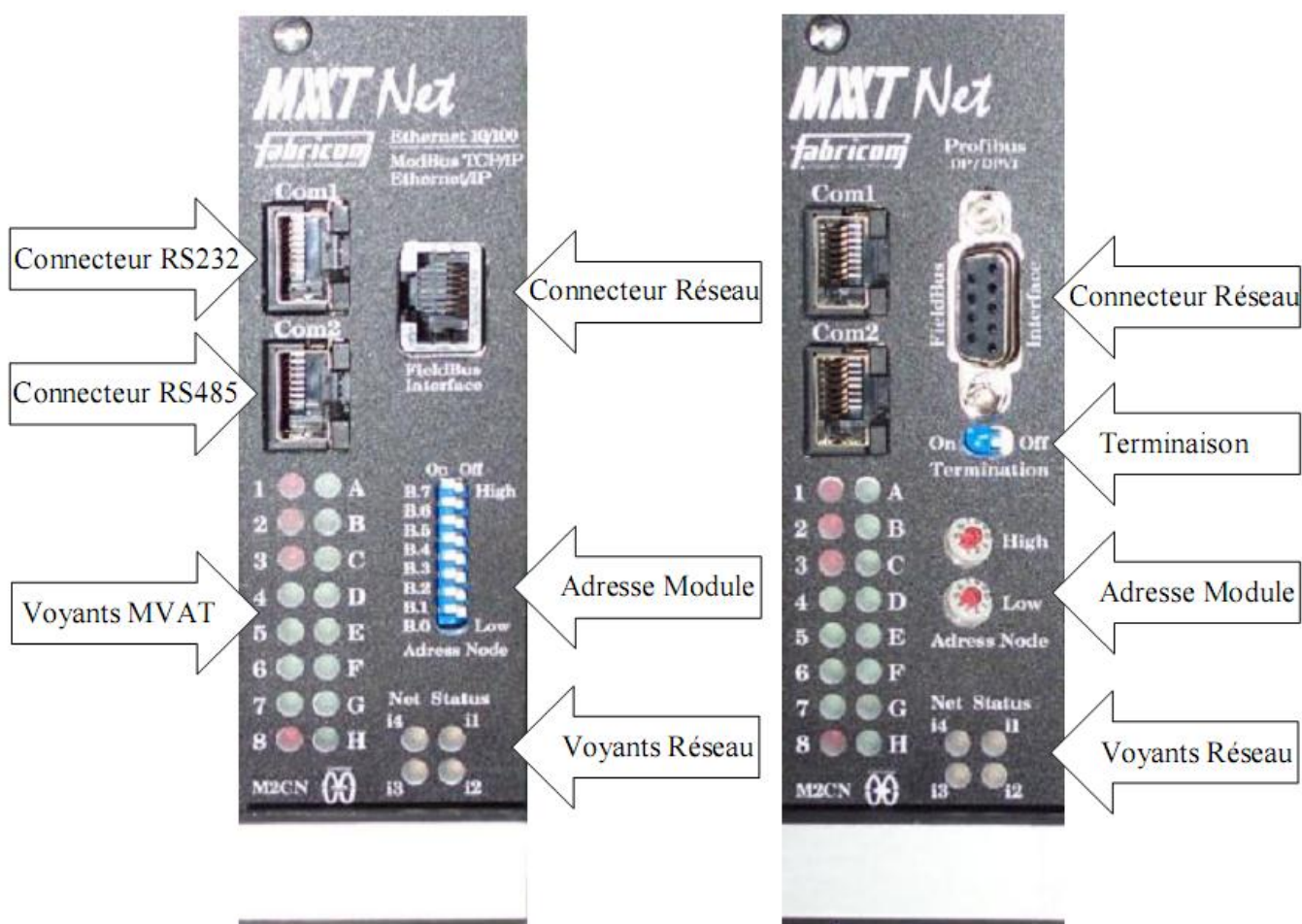
All the designated MVATNet couplers have the same hardware architecture.

An MVAT communication part which comprises:

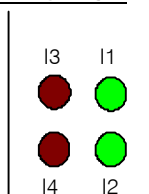
- 1 connector to the MVAT network owner Multip allowing dialogue between cards.
- 1 RS232 connector for testing and maintenance
- 1 RS485 connector for sending protected data to the PC, Supervisor, etc.
- 16 operation and communication indicator lights

A Field bus comprising:

- 1 connector to a specific network such as CANopen(SubD9M), Profibus(SubD9F), Ethernet TCP(RJ45), etc.
- 1 module address selector (Switches or Commutators), speed selector (CANopen), etc.
- 1 termination switch for line impedance (which may also exist on the socket e.g. Profibus).
- 4 Field bus operation and fault indicator lights.



NETWORK INDICATOR



Ethernet Modbus/TCP/ Ethernet IP

Number	Colour	Status	Comment
1	Green	On	Module has a connection established
		Off	No connection detected
2	Green	On	The module is working normally
		Off	The module is not switched on
		1 Hz	The module is not configured correctly
	Red	On	Major internal error detected
		1 Hz	Minor recoverable error detected
	Green/ Red	1 Hz	Power on self-test in progress
3	Green	On	At least one IP Ethernet address detected
		Off	No power or No Ethernet address detected
		1 Hz	No Ethernet connection established
	Red	On	Duplicate IP address detected
		1 Hz	The connection time has been exceeded
	Green/ Red	1 Hz	Power on self-test in progress
4	Green	Flash Once	Each packet has been received or sent

Profibus DP/DPV1

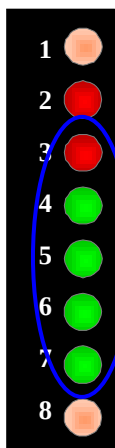
Number	Colour	Status	Comment
1	Green	On	DPV1 request executed normally
		Off	No power or no request executed
2	Green	On	Bus detected, exchange possible
		Off	Bus switched off, no power supply to module
		1 Hz	Delete mode
3	Red*	On	Bus switched off (*inverse of LED 2)
		Off	Bus switched off, no power supply to module
4	Red	Off	No diagnostic or no power supply
		1 Hz	Error in configuration data
		2 Hz	Error in parameter data
		4 Hz	Error in initialising Profibus ASIC

For more information refer to the "MVAT Net User Manual"

Fault codes on MVAT indicator lights

These codes are indicated by green indicator lights (and unencrypted via the RS232 link) and are identical for all networks. See the example in the screen below for error code 0x05 which appears on power up as the MVAT part initialises quicker than the network part.

Faults higher than 0x06 are global and the Hyper Terminal is needed to specify the group and the type affected by the error message.



	No.	Error
● ● ● ● ● ● ● ●	0x00	The Network module is not ready to be initialised
● ● ● ● ● ● ● ●	0x01	Start of initialisation
● ● ● ● ● ● ● ●	0x02	Initialisation of Network module
● ● ● ● ● ● ● ●	0x03	Initialisation of Network
● ● ● ● ● ● ● ●	0x04	End of initialisation
● ● ● ● ● ● ● ●	0x05	Line switched off
● ● ● ● ● ● ● ●	0x06	Mac ID
		
● ● ● ● ● ● ● ●	0x0C	Multip FieldBus In/Out Failed (send, line failure, attempt, etc.)
● ● ● ● ● ● ● ●	0x0D	Parameter/Result request confusion
● ● ● ● ● ● ● ●	0x0E	Parameter file error (4 types) 1 – Dynamic Set Points Stack Overload! 2 – File type error 3 – File number error 4 – Set Point number error
● ● ● ● ● ● ● ●	0x0F	FB_DCY or FB_CYCL_ON must not be enabled
● ● ● ● ● ● ● ●	0xff	No error detected

9.5 Analysis of malfunctions when first switched on

The application runs for the first time or after hardware replacement

<i>Symptom of malfunction</i>	<i>Message on RS232 Hyper terminal</i>	<i>Cause and solution</i>
Shaft exits or returns at maximum speed		Motor phases reversed relative to those of the synchro-resolver
Pressing calibration: the shaft does not rise back up after application force		Force sensor wired wrong way round: check by command "Esc O"(see keyboard commands) Or current limited by RHAPSODIE.NET (calibration current) or by the speed controller settings.
Pressing calibration: shaft exits then stops	"Force before pulse fault"	Mechanical problem (sticking point, obstacle, etc.)
Pressing calibration: shaft exits then stops after a short distance		Check whether the brake has been disabled or whether the INFRANOR speed controller is not malfunctioning
	"Displacement change fault"	Resolver or coder pulses absent or PULSE absent Or travel time between the index release and the 1 st PULSE is greater than 1 sec: increase the pressing calibration speed
	"Index change fault"	The index remains present all the time
Cannot start a cycle or carry out calibration	"Index NOK"	The shaft has not returned sufficiently or the index is absent.
	"Offset fault"	Sensor absent or wiring fault. Check using command "Esc C"
	"Unbalancing fault"	Force sensor wiring fault
	"Force before index release fault"	The max. force entered, protecting between PULSE-1 and the approach position, is too weak
During a cycle, the shaft stops on approach		Current limitation in the cycle (see RHAPSODIE.NET) Current limitation in speed controller (see BPCW 2.6) If speed controller fault $I^2t \Rightarrow$ holding time too long for the trip force requested

9.6 List of execution faults

The fault number given in the sequence result block on the 3rd row is the number in the 1st column of the table

<i>Fault no.</i>	<i>Message on RS232 Hyper terminal</i>	<i>Cause and solution</i>
1	EMERGENCY STOP FAULT	Execution fault: cycle start release (E1) during sequence
2	EXIT TIME FAULT	Programming or execution fault: Programmed "Cycle time" in cycle page exceeded
3	SEQUENCE TYPE FAULT	Execution fault: start of the pulling calibration sequence was incorrect
4	OFFSET FAULT	Execution fault: the force sensor offset is greater than the "Offset Fault Threshold" set point Remedy: - Check the offset using the command "ESC o" - Increase the offset default threshold setting in the specification file (slightly) - Carry out calibration again
5	INDEX NOT PRESENT AT START FAULT	Execution fault: detector not present before pin motor starts Cause: - the pin is not in fall-back position - Put the pin shaft back using manual mode - the index has not been seen by the MVAT - Check the wiring of the index Remedy:
6	FORCE BEFORE INDEX RELEASE FAULT	Execution or programming fault: force encountered during detector presence. The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement. Remedy: - Clear the tip of the pin - Check the force using the command "ESC o"
7	FORCE BEFORE PULSE FAULT	Execution fault: force encountered before the PULSE has been received (between the detector and the PULSE). The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement. Remedy: - Clear the tip of the pin - Check the force using the command "ESC o"
8	FORCE BEFORE APPROACH FAULT	Execution fault: the MVAT measures a force before the "Approach position" set point. The force measured is greater than the "Safety force" set point or the "Trip force" set point or the "Maximum force" set point Remedy: - Clear the tip of the pin - Check the approach position
9	STOP ON LOWER SAFETY IN CALIBRATION MODE FAULT	Execution fault: - Maximum displacement reached in calibration mode (displacement measurement overflow 10000mm depends on the number of pulses) - Phase wiring reversed (IN+ and IN-) in this case the fault appears on the first PULSE Note: In the case where signals from the speed controller are used for displacement, if the direction of the motor is reversed in the Infranor program (Reverse movement), the IN+ and IN- wiring must also be reversed.
10	STOP ON LOWER SAFETY IN CYCLE FAULT	Execution fault: max. displacement reached in calibrating "Lower Safety Position" set point

11	STOP ON MAX FORCE FAULT	Execution fault: no "Trip Force" programmed stop on max end stop force ("Safety Force" set point or "Maximum force" set point)
12	STOP ON LOWER SAFETY ON INERTIA FAULT	Execution fault: during the "Holding time", the pin reaches the "Lower Safety Position" set point
13	LINE SELECTION FAULT	Programming fault: test whether the curve selection is between 0 and 16
14	SETTINGS NOT CORRECT WITH THE CYCLE DEFINITION	Programming fault: this is in the case of a positioning sequence (the sign of the value must relate to the cycle type)
15	PIN POSITIONING ERROR	Execution fault: detector not present on the cycle start
16	INDEXER BEFORE PULSE ON RETURN FAULT	Execution fault: during the return phase, the MVAT see the presence of the "index presence" inductive detector Cause: interference of the indexer by the motor or the environment. Remedy: - Check the wiring, in particular the grounds, proximity of the measuring cable to the motors or power cable - Increase the index filtering time (Index filter field in the specification page).
17	RECOVERY OF PULSE BEFORE INDEXER ON RETURN FAULT	Execution fault: the MVAT sees PULSE-1 or the "Idle position from TDC" set point before seeing the presence of the detector. Cause: - Problem of coder coupling on UE with belt drive, check the coupling bellows - Index Centring incorrectly centred between the two resolver or coder pulses. Check the centring of the TOPs in the calibration result. (command "e" in the HyperTerminal)
18	STOP ON INDEXER MANUAL CONTROL	indicates that the MVAT stopped on the detector
19	STOP ON SAFETY FORCE MANUAL CONTROL	Indicates that the MVAT stopped on the Safety Force or 10% of the true rated force
20	CALIBRATION NOT DONE FAULT	Execution fault: the MVAT card has not recorded a pressing calibration
21	RATED FORCE PROGRAMMING FAULT	Programming fault: "Sensor Rating" set point incorrect
22	CALIBRATION FORCE PROGRAMMING FAULT	Programming fault: "Pressing Calibration Force" set point incorrect
23	SPEED PROGRAMMING FAULT	Programming fault: the speeds on the specification screen page or the cycle screen page
24	CYCLE DEFINITION PROGRAMMING FAULT	Programming fault: the mode relating to the type of cycle is not defined or inconsistent
25	FORCE BEFORE PULLING APPROACH FAULT	Execution fault: the MVAT measures a force during the pulling approach phase. The force measured is greater than the "Trip force" set point or the "Maximum force" set point
26	TRIP POSITION > APPROACH POSITION PROGRAMMING FAULT	Programming fault: the pressing "Trip Position" set point is greater than the pressing "Approach Position" set point
27	CALIBRATION FORCE < PRESSING FORCE PROGRAMMING FAULT	Programming fault: the pressing "Trip Force" set point is greater than the "Pressing Calibration Force" set point
28	SELECTION PROGRAMMING FAULT	Programming fault: the selection of the cycle is incorrect
29	NUMBER OF PULSES INCORRECT FAULT	Execution or programming fault: the resolution (number of pulses/mm) found during pressing calibration is greater or less than the "Max. Resolution" and "Min. Resolution" set points
30	APPROACH POSITION < WORKPIECE MAX HT POSITION PROGRAMMING FAULT	Programming fault: the "Approach position" set point is less than the "Max. Position" (max. work piece position)
31	CALIBRATION REQUEST PROGRAMMING FAULT	Programming fault: the "Pressing Calibration Force" is greater than the value of the pressing calibration force for the last recorded calibration (correct calibration)
32	TRIP < APPROACH ENTERED PROGRAMMING FAULT	Programming fault: the pulling "Trip Position" set point is less than the pulling "Approach Position" set point

33	APPROACH DISPLACEMENT < TABLE OPENING PROGRAMMING FAULT	Programming fault: the pressing "Approach position" set point is less than the "Top Dead Centre" (the opening of the U ⁵) found during calibration
34	OPERATING MODE PROGRAMMING FAULT	Programming or execution fault: the selected operating mode is incorrect
35	SLOWING DOWN POSITION < TRIP POSITION PROGRAMMING FAULT	Programming fault: the pressing "Slowing down Position" set point is less than the pressing "Trip Position" set point
36	MAX CHAINING > 100 CYCLES PROGRAMMING FAULT	Execution fault: the number of chained cycles is greater than 100
37	APPROACH > WORKPIECE MIN POSITION ENTERED PROGRAMMING FAULT	Programming fault: the pulling "Approach position" set point is greater than the "Min. Position" (min. work piece position)
38	SPEED OFFSET FAULT	not active
39	MEASUREMENT OVERFLOW FAULT	Execution or programming fault: the allowed offset + the measurement exceeds the true rated force (useful force) Example: offset = - 200 daN; true rated force = 3000 daN, measurement without offset correction = 2900 daN, true measurement = 2900 - (-200) = 3100 daN = exceeds the true rated force. This test is carried out when the value is stored. During execution, the saturation of the measurement is checked.
40	SETPOINT OVERFLOW FAULT	Execution or programming fault: the offset + requested force set point exceeds the true rated force (useful force)
41	STOP ON RETURN FORCE FAULT	Execution or programming fault: the MVAT measures a force during the return phase which is greater than the "Safety Return Force" set point Remedy: - Check the force using the command 'ESC o' (warning, offset display does not work just after a RESET) - Increase the safety return force parameter in the specification tab
42	EXTERNAL CHAINING PROGRAMMING FAULT	not active
43	PULLING TRIP POSITION > DISPLACEMENT CARRIED OUT PROGRAMMING FAULT	Programming fault: the pulling "Trip Position" is greater than the current pin displacement
44	SEMI-MANUAL MODE => E3 OR E4 FAULT	Keyboard command execution fault: if in SEMI-MANUAL MODE, inputs E3 or E4 must be active
45	PULLING APPROACH POSITION > DISPLACEMENT CARRIED OUT PROGRAMMING FAULT	Programming fault: the pulling "Approach Position" is greater than the current pin displacement
46	CHAINING SELECTION NUMBER PROGRAMMING FAULT	Programming fault: the number of chained cycles is greater than 384
47	INPUTS (E3+E4) AT THE SAME TIME FAULT	Keyboard command execution fault: on the start of the cycle, inputs E3 or E4 are simultaneously active
48	CHAINING CONTINUATION AS CYCLE NOT OK FAULT	Execution or programming fault: chaining is requested on a bad cycle although the "Cycle resume if Nook" flag is not enabled (box checked)
49	SELECTION 0 ON CHAINING BY PLC FAULT	Execution or program fault: automatic chaining but no cycle no.
50	PULLING CALIBRATION FAULT	Execution fault: pulling calibration not saved or initialised
51	DISPLACEMENT CHANGE FAULT	Execution or programming fault: safety time relating to the release of the detector and change in displacement measurement elapsed. Safety time = 2 secs. Cause: not enough pulses during a covering time delay. Remedy: - check the coupling in the case of a belt-driven press-fitting unit - check the encoder wiring in the case of a belt-driven press-fitting unit - check the programming of the number of pulses (Infranor speed controller) in the case of a direct drive press-fitting unit
52	NO AUTOMATIC RETURN FAULT	Execution or programming fault: where the "Auto Return" flag is not enabled (the box is not checked) and the cycle requested is not 513 in non-automatic return mode, cycle 513 must be called to carry out the return

53	AWAITING AUTHORISATION TO CONTINUE CYCLE FAULT	not active
54	INDEXER CHANGE FAULT	Execution or programming fault: safety time relating to the start of the pin motor and release of the detector elapsed. Safety time = 2 sec. Cause: the index does not disappear after the pin starts, it is therefore impossible to raise it back up in manual mode. Remedy: check the wiring to the index
55	SENSOR UNBALANCE FAULT	Execution fault: before starting the pin, the MVAT card carries out a test on the force sensor and the measuring chain. This test involves unbalancing the sensor by a known amount (50% of the true rated value) and checking this value
56	INDEXER FAULT DURING PULLING	Execution fault: the MVAT sees the presence of the detector during the pulling phase
57	STORAGE BUT NO TRACE SEQUENCE FAULT	Programming fault: tracing has been requested by setting the flag "Store the Curve" to YES, but there is no curve number associated
58	NO PROGRAM CYCLE START FAULT	Execution or programming fault: indicates no program cycle start indicated
59	CALIBRATION FORCE TOO SMALL FAULT	Programming fault: indicates that the "Pressing Calibration Force" set point is less than 25% of the true nominal force (useful force)
60	SPLINE HOLDING TIME FAULT	Execution or programming fault: "Holding time" expired but no splines found
61	NEW CALCULATED TRIP POSITION < LOWER SAFETY POINT FAULT	Programming fault: the "Trip Position" set point calculated relative to the current displacement (positioning sequence) is less than the "Lower Safety Position" set point
62	TABLE OPENING CALIBRATION FAULT	Execution or programming fault: the pressing elasticity measurement is greater than the "Pressing elasticity" set point
63	FILE ERROR FAULT	Programming fault: indicates that there are one or more incorrect values in the cycle file selected
64	MAX DISPLACEMENT REACHED ON PULLING	Execution fault: where there is no programmed pulling trip position indicates that the MVAT reached position 0 which is the starting PULSE
65	RATED CALCULATION FAULT	Programming fault: the useful calculation force is not valid. The "Rated Calculation Error" message runs round in a loop. RATED CALCULATION ERROR: 01 sensitivity entry error 02 load limit overrun error (warning, the new rated value calculated with the "Overload max. factor" must be greater than the true rated value calculated with the sensitivity. In this case an Overload max. factor >1 must be entered, for example, 1.2) 03 class entry error 04 sensor power supply overrun error (15 volts) 05 sensor power overrun allowed (15 volts) 06 requested force correction > positive authorised percentage error 07 requested force correction > negative authorised percentage error (if in the Quality Department menu a value is entered in the Max. force correction field and nothing in the other fields, you will have this fault which scrolls on the screen with the nearest output flashing)
66	APPROACH > OPENING FAULT	Programming fault: the "Approach position" set point is greater than the "Top Dead Centre" (the opening of the Ue) found during calibration
67	MEASUREMENT SATURATION	Execution or programming fault: indicates that the force measured exceeds the true rated force (useful force)
68	FORCE BEFORE END YES BUT NO TRACING	Programming fault: indicates that the "Force before stop result" is enabled (box checked) although the "Store the Curve" flag is disabled (box not checked)
69	TABLE OPENING OFFSET FAULT	Programming fault: indicates that the "Offset from Actual Working Plane (PRV)" is positive and greater than the Top Dead Centre (the opening of the UE) found during calibration
70	DISPLACEMENT POSITION CALCULATION OVERFLOW FAULT	Programming fault: indicates that there is a positive position set point greater than the opening of the UE for the sequence requested (cycle+curve). Example: opening 249.418mm; programmed position 250mm
71	PULLING CURVE FAULT (POSITION FAULT IN THE CURVE CHECK; NO. OF PULLING WINDOWS NOT EQUAL TO NO. OF PRESSING)	Execution or programming fault: expansion case: indicates that the number of pulling windows which have been executed is not equal to the number of pressing windows executed in order to carry out the curve

	WINDOWS)	check in pulling mode. The number of windows executed in pulling mode must equal the number in pressing mode.
72	WINDOW FAULT (POSITION FAULT IN THE CURVE CHECK)	Marker with the same address twice A window has been defined which could not be drawn (window outside the cycle) or the marker has been stored which should not have been
73	NO. EXEC WINDOW FAULT	The number of windows executed differs from the number of windows programmed
74	PULLING CURVE RELOAD FAULT	Programming fault: the sequence is trying to reload a curve on a pulling cycle in which storage has been requested
75	ACCELERATION OVERFLOW FAULT	Programming fault: the acceleration setpoint is too large
76	SPEED AND ACCELERATION INCONSISTENCY	Programming fault: The requested speed and acceleration distance are inconsistent
77	POSITIONING CYCLE FAULT	Programming fault: the first cycle in the sequence is a positioning cycle.
78	INDEX SELECTION EXECUTION FAULT	Execution fault: the index has been moved (case of multiple indexes)
79	INDEX SETPOINT EXECUTION FAULT	Execution fault: the index has been moved (case of multiple indexes)
80	PLC STOP FAULT	Execution fault: The PLC is no longer responding
81	CURVE RELOAD AUTHORISATION FAULT	Programming fault: Curve reloading is not authorised during a sequence
82	OPENING FAULT	Execution fault: The Top Dead Centre calculated at the end of calibration is outside tolerances (TDC Max and TDC Min in the "Setpoints" tab of the "Specifications" page
83	MAX NO. OF PROFILE WINDOWS FAULT	Programming fault: In profile mode, a maximum of 5 recording ranges is allowed.
84	WINDOW MARKER FAULT	Execution fault: An internal error has occurred in calculating the position of the check window.
85	FORCE BEFORE STOP IN PROFILE MODE FAULT	Programming fault: in advanced curve mode (Profile), the "Force before Stop Result" on the Cycle page may not be requested.
86	WIN/CYCLE CONSISTENCY FAULT	Programming fault: on a complete sequence, if one of the cycles has its "Force Before Stop per Cycle" box checked, it must be the same for all cycles in the sequence and the "Per cycle" box on the Curve page must also be checked for the curve associated with this sequence. In this mode, curve reload is possible with Hard chaining (but only for standard curves - curve prog. from 1 to 16) Similarly, on a complete sequence, if one of the cycles has its "Force Before Stop per Cycle" box unchecked, it must be the same for all cycles in the sequence and the "Per cycle" box on the Curve page must also be unchecked for the curve associated with this sequence.
87	TRIP BY EXTERNAL INPUT	Indicates that the trip has been carried out by an external input, ON/OFF input E5
88	NO. OF RECORDINGS EXECUTED NOT EQUAL TO NO. OF RECORDINGS PROGRAMMED FAULT	Fault linked to a curve reload => curve reload not possible. In PROFIL Mode, to reload a curve, a test must be made that all programmed recordings have been executed
89	CALIBRATION FILE ERROR FAULT	Programming fault: indicates that there are one or more incorrect values in the calibration file selected
90	RESOLUTION MESSAGE ENTERED	Calibration result message without gage
91	HARDWARE RESOLUTION MESSAGE	Calibration result message without gage
92	SPEED DIRECTION FAULT	The direction of the speed setpoint is not equal to the direction of the force measured
93	CALIBRATION FUSE VALUE FAULT	Calibration fuse value fault in the flash memory
94	STOP MESSAGE ON THE POSITION IN CONTROL MODE	In control mode, indicates that the stop is carried out on the position
95	POSITION DISPLACEMENT NOT VALID IN CONTROL MODE FAULT	This fault occurs in control mode:

		- If an absolute or relative ascent is requested after power on, then the shaft is not at its origin - If an absolute or relative descent is requested after power on, then the shaft is not at its origin - If a change is made to this mode without having started by descending
96	NO POSITION IN CONTROL MODE FAULT	This fault occurs in control mode: - If an absolute or relative ascent or descent is requested when no position has been entered
97	MAX THRESHOLD TRIP FAULT	A trip has occurred on the max threshold set point. The sequence is interrupted
98	SPEED DECIMAL PLACES FAULT	The MVAT has received a speed set point with 3 decimal places while the maximum is 2 decimal places
99	FORCE BEFORE END BUT NO DISTANCE BEFORE END SETPOINT FAULT	A force before end is requested although no distance before end set point has been programmed
100	FORCE BEFORE END BUT NO CALCULATION FAULT	Programming fault: the force before end is requested but the force before end has not been able to be calculated as: - we are in window/sequence mode ("Per Cycle" field in profile program not checked) while the recording windows have not all been run through - a force before end is requested while the curve check took place in the previous cycle - we are in window/sequence mode, and it is only possible to have the force before end at the same time as the curve calculation. i.e. once all windows have been executed.
101	HARD CYCLE START NOT ACTIVE IN CONTROL MODE FAULT	In control mode, the Hard cycle start (On/Off input E1) must be raised.
102	CONTROL MODE NOT AUTHORISED FAULT	Programming fault. The "Keyboard controlling enabled" box in the Appendix Specifications page is not checked.
103	ABSOLUTE DESCENT POSITION IN CONTROL MODE FAULT	In control mode, programming fault associated with the absolute descent command: - positive set point: Descent set point > table opening (TDC) - negative set point: Descent set point < Lower safety position
104	ABSOLUTE ASCENT POSITION IN CONTROL MODE FAULT	In control mode, programming fault associated with the absolute ascent command: - positive set point: Ascent set point > table opening (TDC) - negative set point: Ascent set point < current position
105	RELATIVE ASCENT POSITION IN CONTROL MODE FAULT	In control mode, programming fault associated with the relative ascent command: - positive set point: Ascent set point > current position - negative set point: Relative ascent set point must not be negative
106	RELATIVE DESCENT POSITION IN CONTROL MODE FAULT	In control mode, programming fault associated with the relative descent command: - positive set point: - New descent position > safety set point - Relative descent set point too big => overflow - negative set point: Relative descent set point must not be negative
107	SPEED CONTROLLER NOT READY IN CONTROL MODE FAULT	Execution fault. The speed controller is not ready
108	SEQUENCE TERMINEE	En mode pilotage uniquement, les numéros de « MESSAGE » sont utilisés par le pupitre UExp-MVAT pour traduire le message
109	DEFAUT ASSERVISSEMENT EN VITESSE POUR LA POURSUITE D'EFFORT	En mode poursuite Effort, il y a eu un défaut d'asservissement vitesse. Vérifier les paramètres de ce mode

110	DEFAULT ASSERVISSEMENT EN COURANT POUR LA POURSUITE D'EFFORT	En mode poursuite Effort, il y a eu un défaut d'asservissement en courant. Vérifier les paramètres de ce mode : - soit la consigne de courant est > à 50% du courant max au moment du déclenchement à la force - soit la consigne de courant calculée pour compenser la perte d'effort est >50% du courant max.
111	DEFAULT CYCLE DE POSITIONNEMENT A LA FORCE	En mode Incrément d'Effort, il y a eu un débordement du calcul de la nouvelle force à appliquer
112	DEFAULT CORRECTION TEMPERATURE	Peut se produire lorsque la correction température est active, et si il manque le capteur de température bâti durant l'étalonnage, ou durant le cycle
113	DEFAULT MODE POURSUITE ET DECLENCHEMENT PENTE	Les 2 modes de fonctionnement incompatibles : Poursuite effort et Déclenchement Pente ont été activés en même temps.
114	DEFAULT PARAMÉTRAGE DECLENCHEMENT A LA PENTE	En mode Déclenchement à la pente, il y a un défaut de paramétrage : - soit la loupe est trop grande - soit le coefficient de déclenchement est trop grand
115	DEFAULT DEMANDE ETALONNAGE	Quand on passe de la version MVAT V10.05 à V10.06, un étalonnage est nécessaire
116	DEFAULT DEMANDE CORRECTION TEMPERATURE MAIS PAS DE CIRCUIT TEMPERATURE (CIT)	Peut se produire lorsque la correction température est active, et si : - soit dans la saisie déformation bâti en fonction de la température, il y a une valeur alors qu'il n'y a pas de circuit de température - soit en passant de la version V10.05 à V10.06 sans avoir téléchargé les paramètres dans la carte MVAT Remarque : quand on passe de la version V10.05 à V10.06 il faut télécharger les paramètres à partir de Rhapsodie.Net
117	DEFAULT CORRECTION TEMPERATURE	Peut se produire lorsque la correction température est active, et si la déformation bâti calculée à partir de la t° est trop grande
118	DEFAULT CYCLE INCREMENT D'EFFORT	En mode incrément d'Effort : - soit le mode increment d'effort est actif alors qu'on est pas en type de cycle emmanchement - soit on a demandé un increment d'effort sur le 1er cycle
119	DEFAULT ARRET GRAISSAGE	L'arrêt graissage est actif, et le seuil d'arrêt est atteint. Il faut graisser la broche et valider le graissage, soit par Rhapsodie, soit au pupitre UExp-MVAT
120	N.U.	
121	N.U.	
122	N.U.	
123	N.U.	
124	N.U.	
124	N.U.	
126	N.U.	
127	N.U.	

9.7 Liste des défauts liés au contrôle courbe de type Profil

Le N° de défaut donné dans le bloc résultat courbe en 3^{ème} ligne est le N° en 1^{ère} colonne du tableau :

Ex :

Controle Courbe:Profil Courbe N0: 57

Numero de défaut courbe : 04

Debut Largeur Fixe - Fin Fin Cycle - Mode Inclusion Compression

F 01; Fmax : 0,7 daN; Crb <= Max : OK; Fmin1: 0,1 daN; Crb >= Min : TP

Debut Seuil Croissant - Fin Seuil Croissant - Mode Inclusion Traction

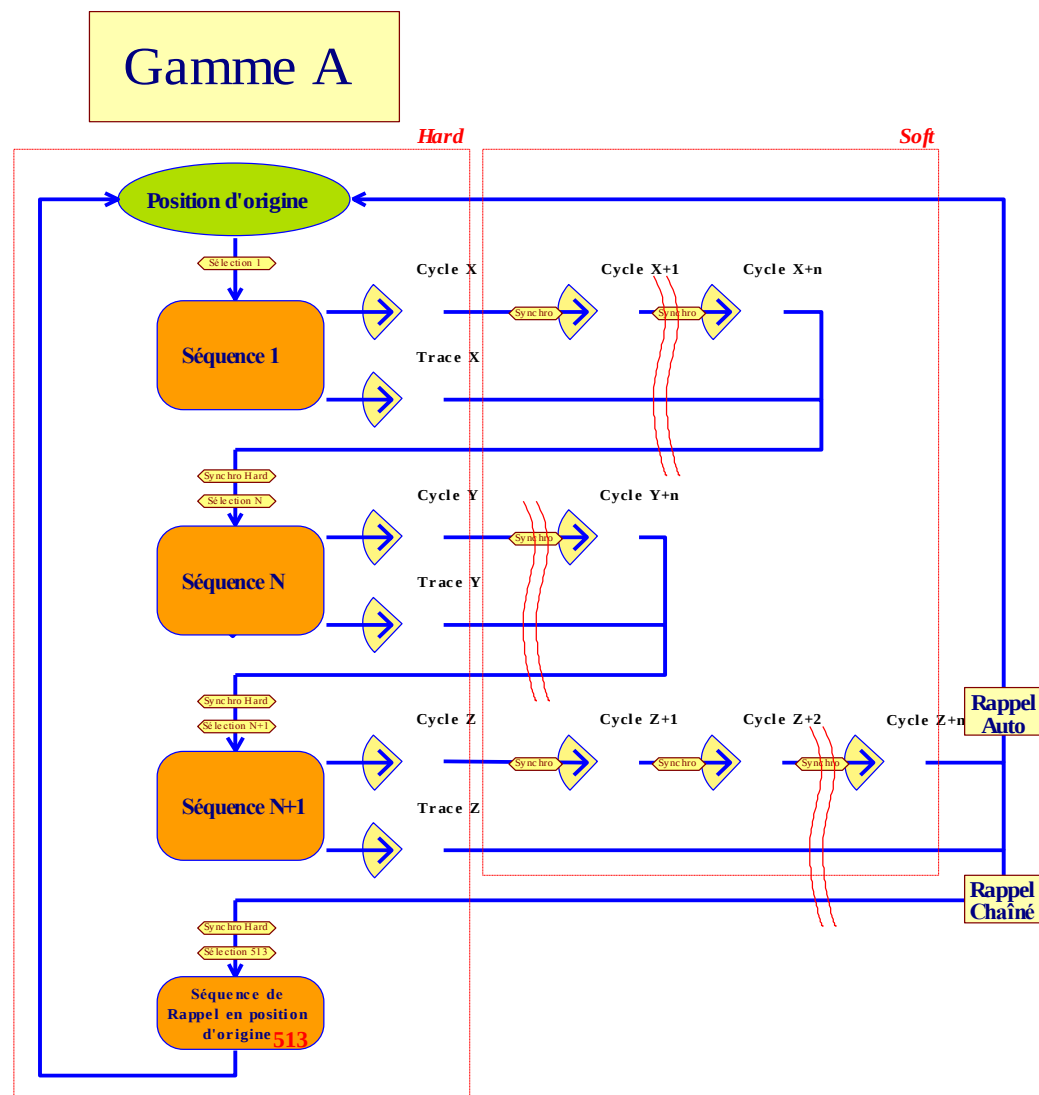
F 02; Fmax : 0,0 daN; Crb <= Max : TG; Fmin1: 0,0 daN; Crb >= Min : TP

N° de défaut	Message sur Hyper terminal RS232	Cause et solution
01	DEFAULT DEBUT FENETRE APRES FIN FENETRE	Le début de la fenêtre de contrôle a été trouvé après la fin de la fenêtre dans le sens de l'avance de l'axe.
02	DEFAULT SEUIL DEBUT CROISSANT NON ATTEINT	Le seuil de début de fenêtre dans le sens croissant n'a pas été rencontré dans la zone de scrutation programmée.
03	DEFAULT SEUIL DEBUT DECROISSANT NON ATTEINT	Le seuil de début de fenêtre dans le sens décroissant n'a pas été rencontré dans la zone de scrutation programmée.
04	DEFAULT SEUIL FIN CROISSANT NON ATTEINT	Le seuil de fin de fenêtre dans le sens croissant n'a pas été rencontré dans la zone de scrutation programmée.
05	DEFAULT SEUIL FIN DECROISSANT NON ATTEINT	Le seuil de fin de fenêtre dans le sens décroissant n'a pas été rencontré dans la zone de scrutation programmée.
06	DEFAULT DEBUT FENETRE AVANT DEBUT PLAGE ENREGISTREMENT	Le début de la fenêtre de contrôle a été trouvé avant le début de la plage d'enregistrement, dans le sens de l'avance de l'axe
07	DEFAULT FIN DE PLAGE D'ENREGISTRMENT	La fin de la plage d'enregistrement n'a pas été trouvée.
08	DEFAULT DEBUT FENETRE APRES FIN PLAGE ENREGISTREMENT	Le début de la fenêtre de contrôle a été trouvé après la fin de la plage d'enregistrement, dans le sens de l'avance de l'axe
09	DEFAULT FENETRE EN DEHORS PLAGE ENREGISTREMENT	Le début et la fin de la fenêtre de contrôle ont été trouvé en dehors de la plage d'enregistrement
10	DEFAULT FENETRE PRECEDENTE INEXISTANTE	La fenêtre de contrôle précédente, nécessaire pour placer cette fenêtre de contrôle, n'a pas été placée. Vérifier qu'il ne s'agit pas de la 1 ^{ère} fenêtre de contrôle.
11	DEFAULT FENETRE SUIVANTE INEXISTANTE	La fenêtre de contrôle suivante, nécessaire pour placer cette fenêtre de contrôle, n'a pas été placée. Vérifier qu'il ne s'agit pas de la dernière fenêtre de contrôle.
12	DEFAULT DEBUT FENETRE AVANT DEBUT PLAGE ENREGISTREMENT EN COTE NEGATIVE	Le début de la fenêtre de contrôle a été trouvé avant le début de la plage d'enregistrement, dans les cotes négatives. (vérifier en négatif, -2 est avant -5)
13	DEFAULT FENETRE NON INCLUSE DANS PLAGE D'ENREGISTREMENT	Si la fenêtre de contrôle n'est pas incluse dans la plage d'enregistrement, ce défaut apparait.
14	N.U.	
15	DEFAULT INCLUSION STRICTE	L'inclusion stricte de la courbe d'effort dans la fenêtre de contrôle n'a pas été respectée. La courbe est ressortie de la fenêtre de

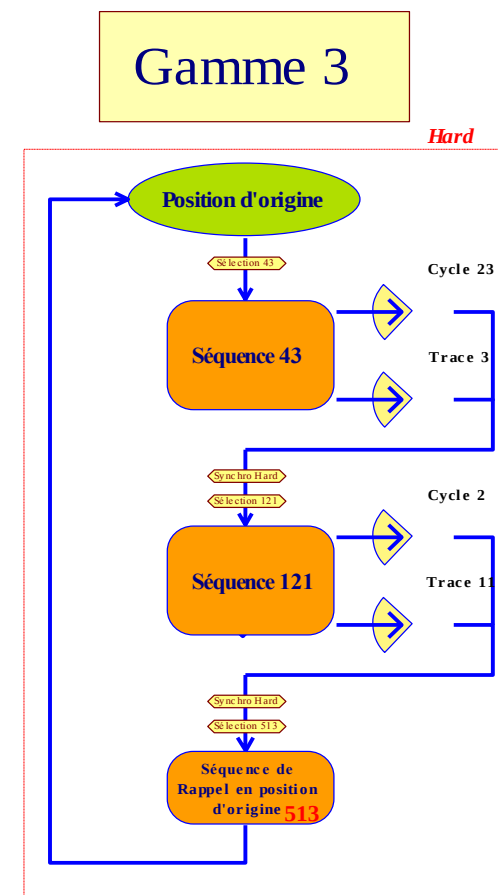
		contrôle après la fin de la fenêtre dans le sens d'avance de l'axe.
16	DEFAULT SEUIL DEBUT INFLEXION NON ATTEINT	Le seuil d'inflexion pour le début de la fenêtre de contrôle n'a pas été rencontré dans la zone de scrutation programmée.
17	DEFAULT SEUIL FIN INFLEXION NON ATTEINT	Le seuil d'inflexion pour la fin de la fenêtre de contrôle n'a pas été rencontré dans la zone de scrutation programmée.
18	N.U.	
19	DEFAULT CALCUL DEBUT REGRESSION LINEAIRE	Le point de départ calculé en regression linéaire est en dehors de la plage d'enregistrement
20	DEFAULT SENS REGRESSION LINEAIRE	Le calcul du point de départ par regression linéaire n'est pas possible car la force de fin de scrutation est inférieure à la force de début de scrutation
21	DEFAULT POSITION FENETRE PRECEDENTE NOK	Cette fenêtre doit démarrer par rapport à la fenêtre précédente mais la fenêtre précédente n'a pas pu être positionnée.
22	N.U.	
23	N.U.	
24	N.U.	
25	N.U.	
26	N.U.	
27	N.U.	
28	N.U.	
29	N.U.	
30	N.U.	
31	N.U.	
32	N.U.	

9.8 Appendix 7 - Principle diagrams

9.8.1 Principe

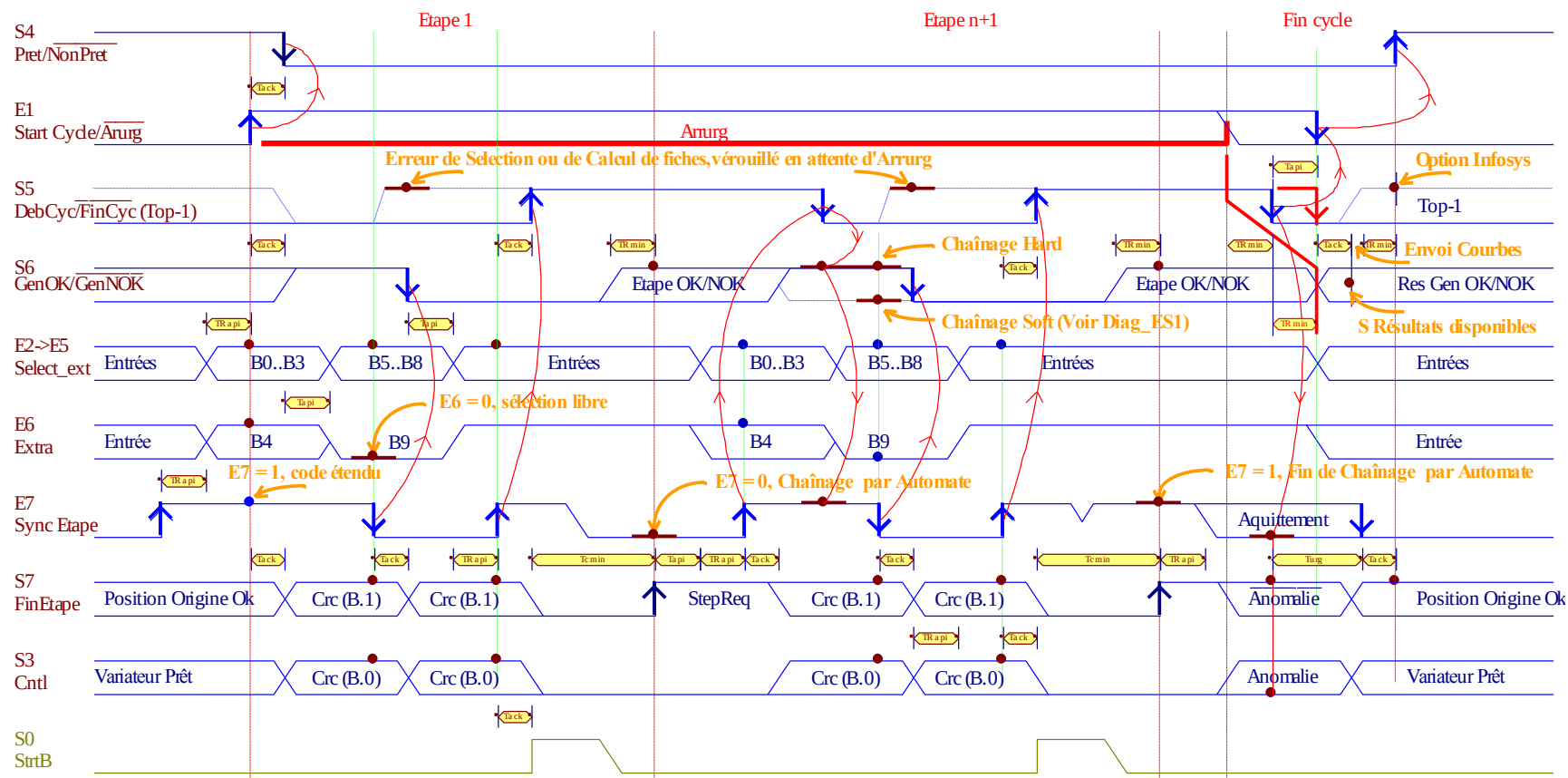


Exemple



9.8.2 ON/OFF I/O with PLC diagram

Press-fitting



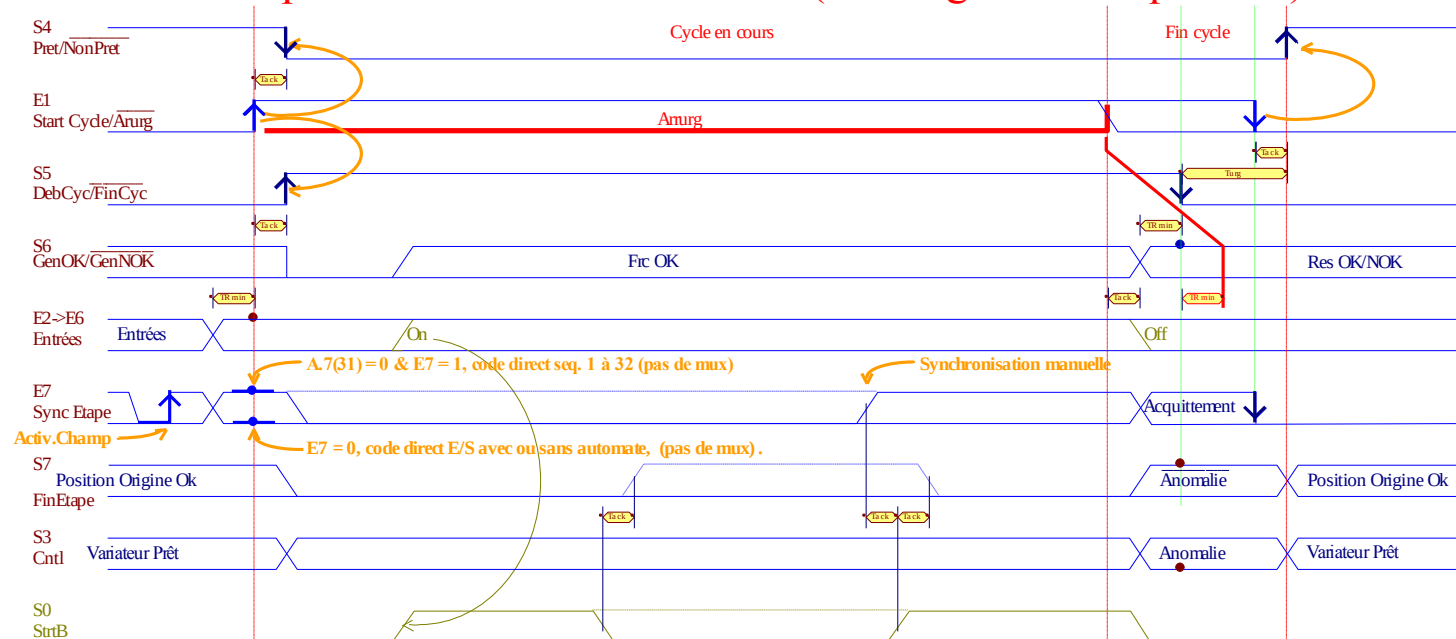
9.8.3 ON/OFF I/O without PLC diagram

Diagramme E/S MVAT Presse sans Automate (Info Générales @31(A.7 = 0))

Séquence manuelle forcée (montée/descente)

Séquence d'étalonnage forcée (compression: cale b./h.)

Séquences manuelles de 1 à 32 (chaînage soft uniquement)



Séquences manuelles forcées

	E7	E6	E5	E4	E3	E2	Code Roues Codeuses
@E1	0	1	1	x	x	1	(26d) Etalonnage Compression Cale Haute
@E1	0	0	1	x	x	1	(10d) Etalonnage Compression Cale Basse
@E1	0	1	0	x	x	1	(18d) Etalonnage Traction
@E1	0	0	0	x	x	1	(02d) Etalonnage Traction
@E1	0	1	0	x	x	0	(17d) Montée Manuelle avec CdF
@E1	0	1	1	x	x	0	(25d) Descente Manuelle avec CdF
@E1	0	0	0	1	0	0	(05d) Montée Manuelle directe, avec CdF *
@E1	0	0	0	0	1	0	(03d) Descente Manuelle directe, avec CdF *

* Si E5=1, Mont/Desc sans CdF (pour sortie de défaut de mesure de force)

Légende

E2 = Etalonnage/Manuelle
E3 = Descente
E4 = Montée
E5 = Compression(Desc)/Traction(Mont)
E6 = Caleh./Caleb.
CdF = Contrôle de Force

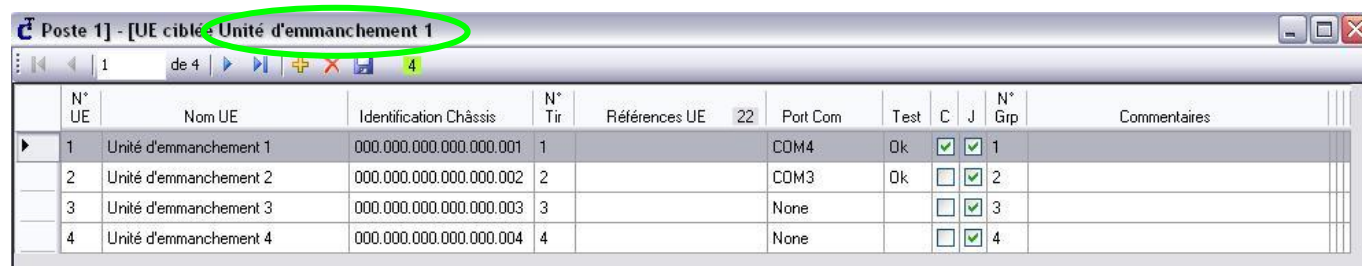
Séquences manuelles de 1 à 32

	E7	E6	E5	E4	E3	E2	Code Roues Codeuses
@E1	1	0	0	0	0	0	Séquence N°1
@E1	1	0	0	0	0	1	Séquence N°2
							"
@E1	1	1	1	1	1	0	Séquence N°31
@E1	1	1	1	1	1	1	Séquence N°32

9.9 Appendix 8 - Communication report

Compte rendu de communication RS485 (dans le journal)

La "boîte d'information" fait référence à un port de communication associé à une Unité d'Emmanchement qui est précisée dans le titre de la fenêtre Page « Unité d'emmanchement » :



N° UE	Nom UE	Identification Châssis	N° Tir	Références UE	Port Com	Test	C	J	N° Grp	Commentaires
1	Unité d'emmanchement 1	000.000.000.000.000.001	1		COM4	Ok	☒	☒	1	
2	Unité d'emmanchement 2	000.000.000.000.000.002	2		COM3	Ok	☒	☒	2	
3	Unité d'emmanchement 3	000.000.000.000.000.003	3		None		☐	☒	3	
4	Unité d'emmanchement 4	000.000.000.000.000.004	4		None		☐	☒	4	

La "boîte d'information" lors d'un envoi de configuration ou de paramètres retourne l'un des 4 états:

- **Terminé Correct !**



ou après le type d'envoi effectué, par exemple:

"Download partiel", "Download complet", "Envoi configuration", "Upload".

- **Nack !**

- **Time Out en Emission !**

- **Pas de compte-rendu de communication**

(dans cet exemple, le port n'est pas précisé car la tentative de communication a été effectuée avant la définition du port)



In the RS485 communication report (in the COM_MVAT journal), you may see, if there has been a communication fault, a row of the type:

"File error: 4xxx"

The meanings of the error codes are given below.

List of File Download communication errors

4100 : Group without rack (configuration undefined)
4101 : Communication error on write
4102 : Communication error on command
4103 : Target of the group not controlled
4104 : Unknown IP
4105 : Unknown or improper group
4106 : File contents in error or incorrect
4107 : Multip network not available for sending packets
4108 : Multip network not available for storing packets
4109 : Multip network not available for sending commands
4110 : Multip network not available for executing commands
4111 : Batch error (batch processing)
4112 : Group not designated as destination of the configuration file
4113 : Non-compliant groups found on network scan at power on
4114 : Group no. not equal to rack no.
4115 : Configuration Error
4200 : CHR Timeout
4201 : CKS error
4202 : Too many characters
4203 : Unknown file type

Change at 26/07/2006 from version MVAT V05.17-7

Usage restrictions have been made:

- Group no.0 (test group) no longer exists, else error 4113 or 4114
- The configuration must be sent on communication from the 1st unit of the 1st MVAT rack location, else error 4112
- The racks declared in the configuration file must exist in the MultiP SCAN, else error 4113
- The group number must be equal to the rack number else error 4114

Note:

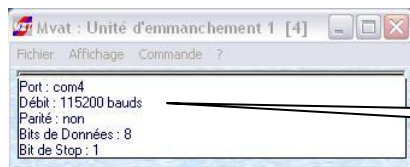
There is no error when less racks are configured than those scanned by Multip. UEs may be disabled without having to withdraw MVAT cards

Racks do not have to be in increasing order, but this is safer and more "readable" to the user.

If one of the racks declared in the configuration file does not exist on the Multip network or if the group no. is not the same as the rack number, the new configuration sent is completely disregarded (the previous configuration is not changed).

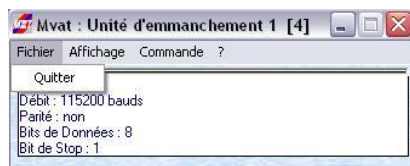
9.10 Appendix 9 – MVAT Com

This is the management of the communication port between the card and Rhapsodie.net



Communication port settings

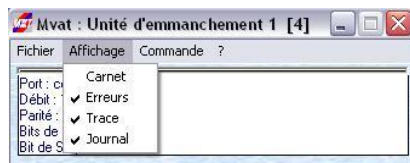
FILE:



Exit: closes the communication port

WARNING it will not be possible to send to the MVAT card or to receive curves

DISPLAY:



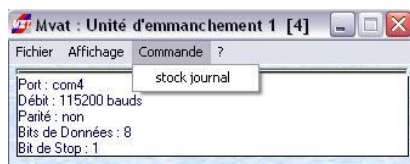
Book: ...

Errors: Displays a summary of communication faults between Rhapsodie and MVAT

Trace: ...

Journal: Displays the press-fitting result blocks

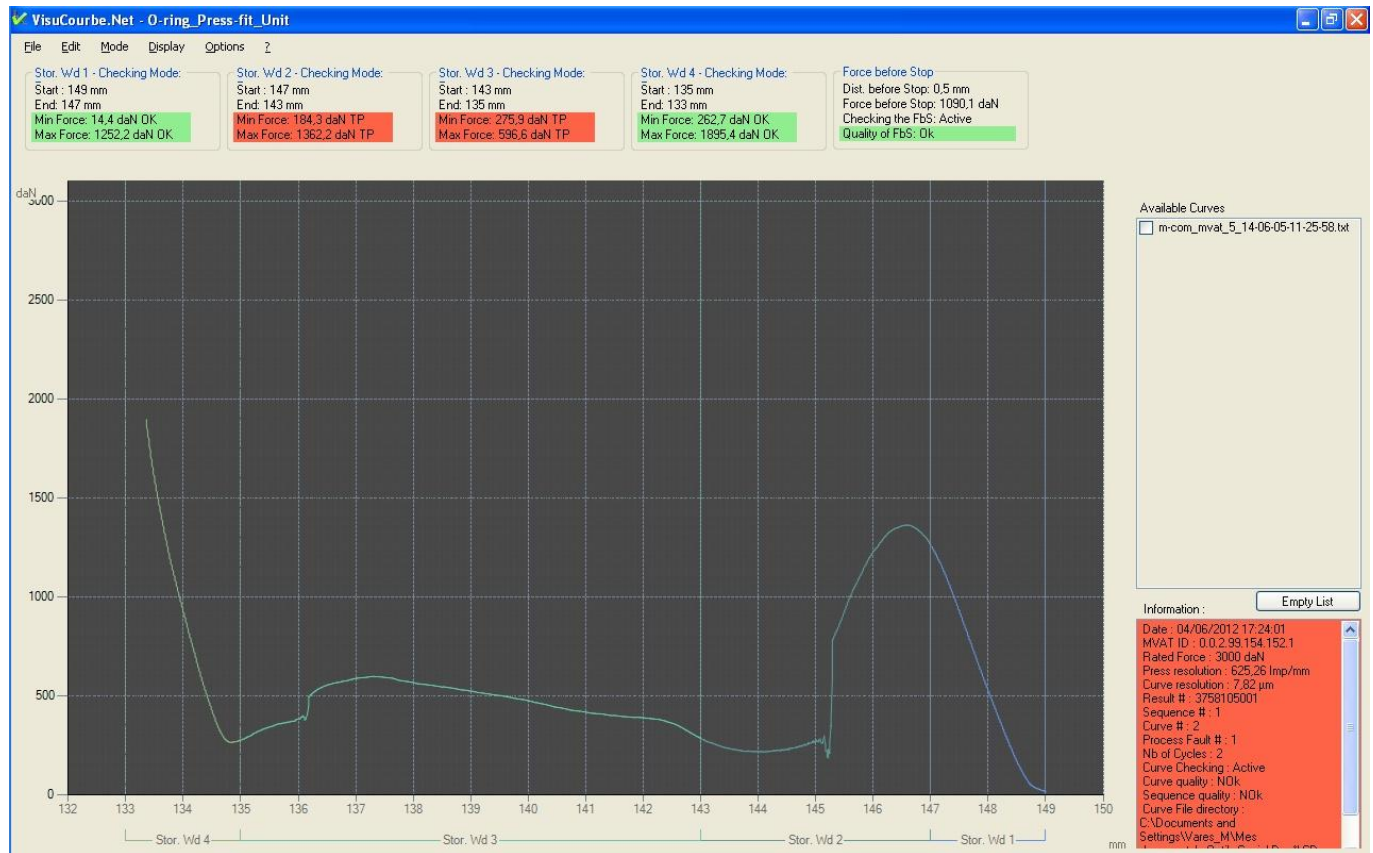
COMMAND:



Journal stock: ...

9.11 Appendix 10 – GRADIENT FUNCTION

Force gradient - Slope checking



The curve for force F which we observe varies according to a displacement (x -axis) from right to left (direction the shaft exits from the press towards the zero point of the axes).

The value of the Force F depends on a point x where it is applied. For a small variation dx in x we obtain a variation dF , defined by:

$$dF = F(x + dx) - F(x)$$

The mean variation $\frac{dF}{dx} = \frac{F(x + dx) - F(x)}{dx}$ is the Force gradient denoted in Physics by $\frac{\Delta F}{\Delta p}$.

When dx is very small, this quotient approaches the derivative as the curve representing a derivable function at one point allows a tangent at this point for which the slope is equal to the derivative of the function. The study of the variation of this slope by a gradient curve reveals the behaviours of the function.

ΔF denoted Delta F represents the variation in the Force

Δp denoted Delta P represents the variation in the Displacement

The analysable displacement is always stored using 2048 points. The curve may be made up of 10 windows each having their own Gain and Delta P.

Delta P represents a number of these points between 1 and 64.

Delta F can take any sort of force value from 0 to that rated for the pin. As it is often only a very small value, as only a small variation, we can amplify it using a factor known as the Gain which can vary between 1 and 500.

Once amplified, $\frac{\Delta F}{\Delta p}$ will be compared with an arbitrary threshold value (free dimension in daN which enables the

Gradient curve to be drawn and by making it significant, "visible").

The expression in pure slope terms is quite difficult (see end of section).

When $\frac{\Delta F}{\Delta p} \times \text{gain} - \text{seuil} > 0$ the detection of an abnormal force variation will be activated.

The S3d tool (MS Excel 2003) allows all these elements to be varied and to immediately draw the response. The objective is to show a good compromise between these elements in order to control the sensitivity with which an abnormal change in slope is detected. The settings thus determined will then be programmed into Rhapsodie's Curve menu.

The windows enable different compromises to be made on the force curve depending on the nature of the forces to be checked. Example:

For a difference in force (ΔF) of 400 daN to invalidate the cycle, the following is required:

A Threshold of 1000, if $\Delta p = 20$ and Gain = 50.

Which is equivalent to:

Threshold = 20 $\Delta p = 20$ and Gain = 1 (graphically less visible in terms of gradient).

This is almost equivalent to:

Threshold = 1000, $\Delta p = 16$ and Gain = 40 (also completely visible but much more sensitive).

According to the following example, for the purists, 1 point on VisuCourbe is equal to 0.0078125 mm, i.e.

$\Delta p = 0.0078125 \times 16 = 0.125$ mm,

The Threshold expressed in terms of slope set point represents:

$\text{Seuil} \times \frac{\Delta p}{\text{gain}} = 1280$ daN/mm,

$\Delta F = 370.24$ daN gives an effective slope of 2962 daN/mm quite sufficient for causing a fault (ΔF min necessary = 160 daN).

Manipulating these terms is a delicate operation, a version of S3d will allow a secondary slope scale (in actual points, the value of the point may vary from 0.976 μ to 0.244mm).

Warning: It is not recommended to look for a ΔF under 20% of the sensor rated value. However, the observation of the fluidity of the curve may allow this value to be lowered.

Fabricom's Solution3d.xls (S3d) assistance tool

Warning concerning S3D:

S3D is a modelling tool for assisting with configuring the gradient check.

S3D on Excel®* is provided "as is" without any express or implicit guarantee of any sort whatsoever covering any direct or indirect loss associated with the ability or inability to use it. FSA provides no servicing, maintenance or modifications to S3d.xls

The user must always check the results obtained and carry out actual production runs in order to validate the settings applied which depend on the behaviour of the assembled products. They must randomly cycle products (components) causing the phenomenon sought by the gradient check.

The user is free to create their own modelling tool to use the MVAT curves from VisuCourbe according to information provided by FSA.

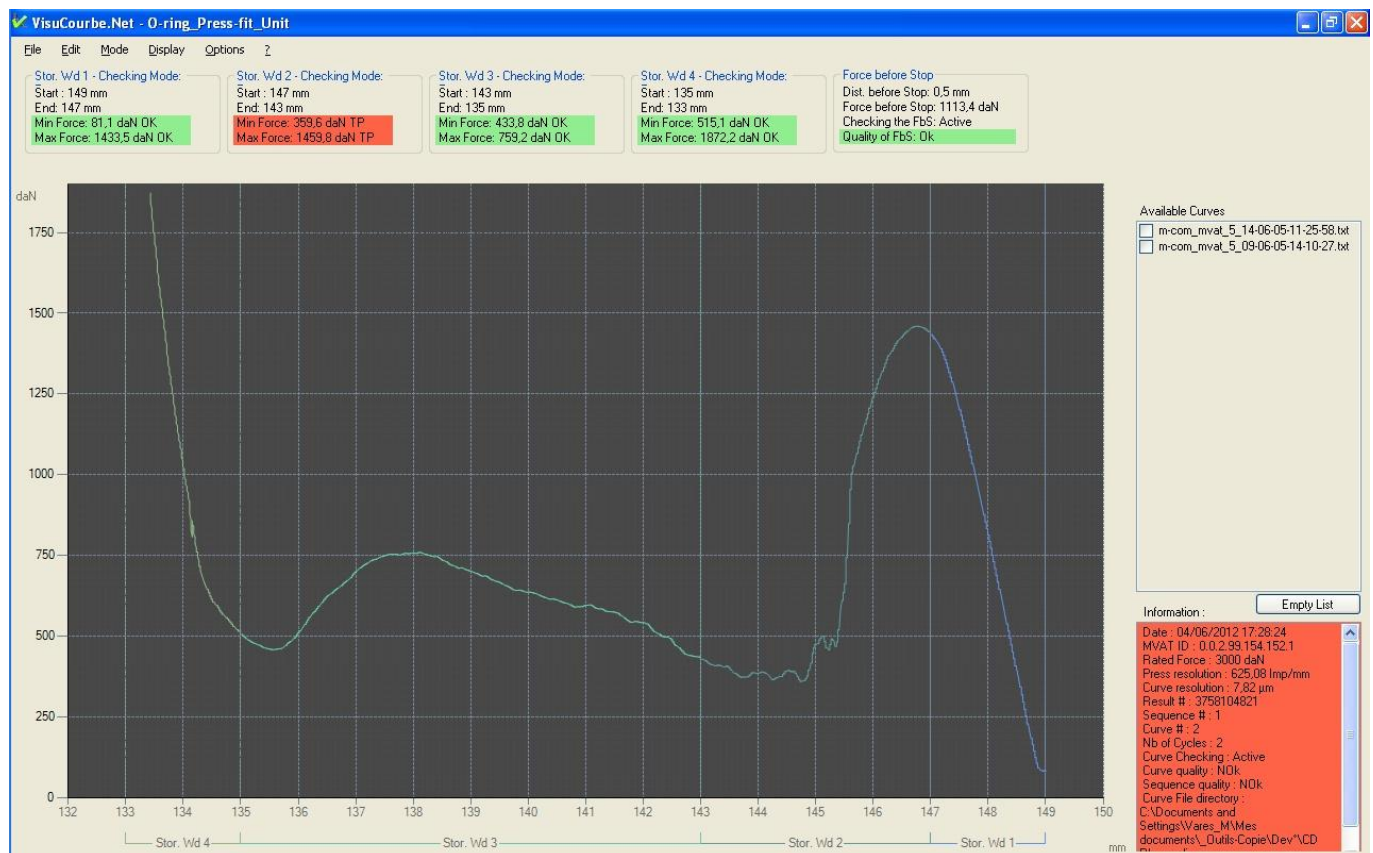
The disclosure of this information may in no way act as a licence and does not assume the protections and rights attached to the use of the information from this software.

However, the reproduction, reference, use of all or part of this computer software in agreement with the provisions of the intellectual property code are still subject to prior written authorisation from FABRICOM Systèmes d'Assemblage S.A.

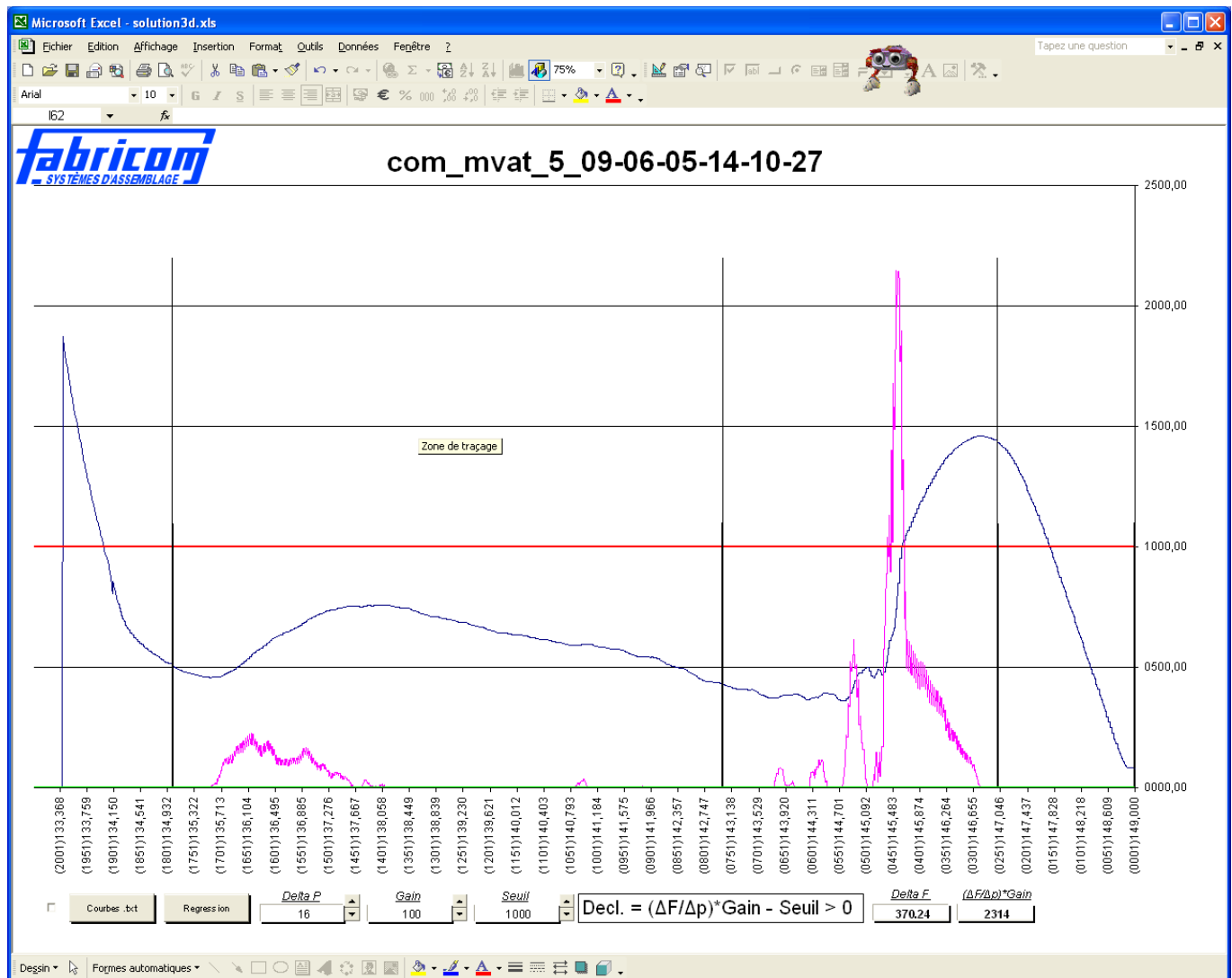
*Excel® property of Microsoft Corp, software not supplied by FSA.

Solution3d.xls uses the curves produced by VisuCourbe (See VisuCourbe manual). The windows are not active but are marked and may be isolated.

Example: curve of an actual event with break.



This curve file opened under S3d allows its force gradient to be observed.



com_mvat_5_14-06-05-11-29-54



9.12 Appendix 11 - Rhapsodie.net Version

RHAPSODIE.NET V1.0
Initial Version.

RHAPSODIE.NET V1.2

RHAPSODIE.NET V1.3
Integration of advanced curve checking

RHAPSODIE.NET V1.4
Change to a "light" version which is in phase with MVAT V10 (management of signatures, defrag, and UExp-MVAT terminal), and integration from version 1.4.1.00 of VisuCourbes "Multicourbes" with recalibration and calculation of Average and Envelope.

RHAPSODIE.NET V1.5
Include the Use of UExp-MVAT, and allows opening curves into Profiles programing.

RHAPSODIE.NET V1.6
Include small corrections + New features in Cycle page (Force increment, slope tripping, temperature compensation)
MVAT fault list available into "Help" menu.